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Detailed Curriculum

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Managing Interest Rate Risk: Types of Interest Rate Risks – Gap Methodology – Duration Analysis.

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Risk Management Strategies: Operational Risk Management Strategies – Financial Risk Management Strategies – Systemic Risk Management Strategies – Risk Limitation – IT Implementation Challenges.

Enterprise-wide Risk Management in Banks: The Necessity of ERM – The Process of ERM – Measurement of ERM – Transfer Pricing – Cases in ERM.

The New Basel Accord – Implication for Banks: An Overview – Basel II Framework – The Three Pillar Architecture – Organizations Affected by Basel II – Impact of Basel II.

<u>Chapter I</u> Introduction to Risk Management

After reading this chapter, you will be conversant with:

- What Risk is All About
- Basic Purpose of Risk Management in Banks
- The Process of Risk Management
- Different Types of Risks in Banks
- Overview of Enterprise-wide Risk Management in Banks

RISK

Peter L Bernstein in his celebrated book, 'Against the Gods – The Remarkable Story of Risk', states that, "in the dark ages risk was always associated with God. As the mankind progressed and business and markets grew, the art of risk management grew from primitive stages to the modern day rocket science."

Risk is an inherent component of our life, be it in business or our personal life. The one who is able to manage it properly emerges the winner.

Risks Associated with Business Activities

In simple terms, risk can be defined as any uncertainty about a future event that threatens the organization's ability to accomplish its mission. Business is a trade off between risk and return.

Box 1

There cannot be a business that is risk-free. This is simply because the underlying principle of a "project" implies the effect of current investment, for a future activity, and a future gain after the "project-construction period" is over, which is referred as the "gestation period" or the lead time of the project. Changes in the intervening period can be either positive or negative. When such changes are adverse, say for example, there is time-overrun or cost escalation, the investment in the project results in a net negative value even before the project is completed. Apart from this, there can also be other associated factors such as several unexpected developments both from the internal and external environments that can render the estimated calculations of the project wrong.

Source: ICFAI Research Center.

The word risk may have different meanings to different users. To a lay man, it has connotations that one invariably associates with the games of gambling or reckless behavior in life. In contrast, to an information age company however, taking risk is one of the most important critical success factors as it encourages innovation. Innovations demand trying of new things, and trying something new again calls for uncertainty where one does not know whether one will succeed or fail. Therefore, it is said to be taking a risk. To some others risk or risk-based functioning is a favourite hobby. Those who fall in this category are termed as speculators. Thus, though risk is an inherent feature of life, its level depends upon the person who wants to take it.

One can move forward only by taking risks. Taking no risk at all may make one feel very secure but it means standing still with the inevitable consequence of stagnation in a fast moving business world. Knowledge will grow where people are able to take risks. Failure will also gain knowledge if the reason for failure is known, recorded and passed on to others in the community so that they do not make the same mistakes. Because of this it is vital that failure is acceptable in the community, otherwise people will cover up their mistakes instead of openly analyzing and learning from them. Failure must be seen as a lesson to the community and not as one individuals' problem. Having briefly discussed the overview of what risk is all about, let us now turn our focus towards the definition of risk.

What is Risk?

Recalling our earlier statements, we can say that risk means different things to different people. For some it is "financial" (exchange rate, interest-call money rates), and for others, "an event or commitment which has the potential to generate commercial liability or damage to the brand image". Since risk is accepted in business as a trade off between reward and threat, it does mean that taking risk brings forth benefits as well. In other words, it is necessary to accept risks, if the desire is to reap the anticipated benefits. Risk in its pragmatic definition, therefore, includes both threats that can materialize and opportunities which can be exploited. This definition of risk is very pertinent today as the current business

environment offers both challenges and opportunities to organizations, which have to manage them to their competitive advantage.

Box 2

Time is a dominant factor in risk. Risk and time are the opposite sides of the same coin, for if there were no tomorrow, there would be no risk. Time transforms risk, and the nature of risk is shaped by the time horizon: so future is the playing field. Time matters most when the decisions are irreversible. And yet many irreversible decisions must be made on the basis of incomplete information. Irreversibility dominates the decisions ranging all way from taking the subway instead of a taxi, to building an automobile factory in Brazil, to changing jobs, to declaring war. If we buy a stock today, we can always sell it tomorrow. But what do we do after the croupier at the roulette table cries, "no more bets", or after a poker bet is doubled? There is no going back. Should we refrain from acting in the hope that the passage of time will make luck or the probabilities turn in our favor?

Source: "Against the Gods", Peter L. Bernstein.

Does the Process of "Risk Management" Eliminate Risk?

Risk management is a discipline that deals with the possibility that some future event will cause harm. The proper management of risk provides strategies, techniques, and an approach to recognize and confront any threat faced by an organization that seeks to fulfill its mission. The basic concept of Risk management is built on the answers to the following questions:

- What can go wrong in the organization?
- What one can possibly do (both to prevent the harm from occurring and in the aftermath of an "incident") in order to avoid or reduce such risk?
- If something adverse happens, how will one pay for it?

It is to be always borne in mind that the process of risk management does not aim at risk elimination, but enables the organization to bring its risks to manageable proportions while not severely affecting their income. This balancing act between the risk levels and the levels of profits earned, needs to be well-planned. Apart from bringing the risks to manageable extent, it is also to be ensured that one risk does not get transformed into any other undesirable risk. This transformation takes place due to the inter-linkage present among the various risks. The focal point in managing any risk is to understand the nature of the transaction so as to unbundle the risks that it is exposed to.

In sharp contrast to our country, the discipline of Risk Management is a more popular subject in the western world. This is largely a result of the lessons from major corporate failures, a telling and visible example being the Barings collapse. In addition, there has been the introduction of regulatory requirements that expect organisations to have effective risk management practices. In India, whilst risk management is still in its infancy, there has been considerable debate on the need to introduce comprehensive risk management practices.¹

Objectives of Risk Management

While discussing the basic objectives of a risk management function, one comes across two schools of thoughts. One speaks about managing risks, maximizing profitability and creating opportunity out of risks and the other concerns with minimizing risks or the loss associated with the business operations and thus protecting corporate assets. The management of an organization needs to consciously decide whether or not it wants to pursue risk management function to 'manage' or 'reduce' risks. Managing risks essentially is about striking the right

¹ Shri Kumar Mangalam Birla Committee Report has been instrumental in SEBI amending the listing agreement, which now requires the Audit Committee to review the company's risk management's policies and the Director's to separately report on risks and controls.

balance between risks and controls and taking informed management decisions on opportunities and threats facing an organization. Both these situations, i.e., over or under controlling risks are not desirable as the former means higher costs and the latter means possible exposure to risk.

The process of mitigating or minimising risks, on the other hand, means mitigating or minimizing all risks even if the cost is excessive and outweighs the cost-benefit analysis. Further, it may also mean that the opportunities are not adequately exploited. In the context of the risk management function, identification and management of risk is more prominent in the financial services sector and less so in the consumer products industry.

Approaches to Risk Management

After the different types of risks are identified, the next step involves identifying the alternate approaches available for managing/reducing the risks. The various approaches are described below:

Avoidance: The concept of risk is relevant if the bank is holding an asset/liability which is exposed to risk. Avoidance refers to not holding such an asset/liability as a means of avoiding the risk. Exchange risk can be avoided by not holding assets/liabilities denominated in foreign currencies. Business risk is avoided by not doing the business itself. This method can be adopted more as an exception than as a rule since any business activity necessitates holding of assets and liabilities.

This approach has application when a bank is planning to decide exposure limits. For example, a bank may decide to avoid a particular industry say, Aquaculture or Poultry, while extending credit or it may decide not to lend to certain type of banks in the money market.

- Loss Control: Loss control measures are used in case of the risks which are not avoided. These risks might have been assumed either voluntarily or because they cannot be avoided. The objective of these measures is either to prevent a loss or to reduce the probability of loss. Insurance, for example, is a loss control measure. Introduction of systems and procedures, internal or external audit help in controlling the losses arising out of personnel. Raising funds through floating rate interest bearing instruments can reduce the losses due to interest rate risk.
- Separation: The scope for loss by concentrating an asset at a single location can be reduced by distributing it to different locations. Assets which are needed for routine consumption can be placed at multiple locations so that loss in case of any accident can be minimized. However, this does simultaneously increase the number of risk centers. Consider two banks, one which has a wide network across the country and another which is confined to one state. An adverse economic scenario of the state will affect the latter more than the former. This is more conspicuous when one compares a cooperative bank with a commercial bank.
- **Combination:** This reflects the old adage of not putting all the eggs in one basket. The risk of default is less when the financial assets are distributed over a number of issuers instead of locking them with a single issuer. It pays to have multiple suppliers of raw material instead of relying on a sole supplier. A well-diversified company has a lower risk of experiencing a recession.
- **Transfer:** Risk reduction can be achieved by transfer. The transfer can be of three types. In the first type, the risk can be transferred by transferring the asset/liability itself. For instance, the risk emanating by holding a property or a foreign currency security can be eliminated by transferring the same to another. The second type of transfer involves transferring the risk without transferring the asset/liability. The exchange risk involved in holding a

foreign currency asset/liability can be transferred to another by entering into a forward contract/currency swap. Similarly, the interest rate risk can be transferred by entering into an interest rate swap. The third type of transfer involves making a third party pay for the losses without actually transferring the risk. An insurance policy covering the third party risk is an example.

When a bank takes a policy to cover the losses incurred on account of misuse of lost credit cards, it is in effect finding someone to finance the losses while it still has the obligation to pay the Merchant Establishment.

Except for the approach of avoidance, the bank can effectively adopt others since by avoiding risks the bank will not be making any profits. From the above discussion on risk, it is now evident that banks can neither do without profits nor risks. However, mere acceptance of risks to remain profitable does not suffice. Apart from the losses that can be incurred due to the risks, there is also an ultimate danger that the bank itself may fail. The question that arises at this point is what should the bank do in order to take risk for greater returns and at the same time not end up in losses? Risk Management is the solution to such a situation.

RISK MANAGEMENT

At the outset it is to be noted that risk management does not aim at risk reduction. Risk management enables the banks to bring their risk levels to manageable proportions while not severely reducing their income. Thus, risk management enables the bank to take required level of exposures in order to meet its profit targets. This balancing act between the risk levels and profits needs to be well-planned. Risk management basically is a five-step process which involves:

- a. Identification of Risks,
- b. Quantification of Risks,
- c. Policy Formulation,
- d. Strategy Formulation, and
- e. Monitoring Risks.

Identification of Risks: Risk can be anything that can hinder the bank from meeting its targeted results. Each risk must be defined precisely in order to facilitate the identification of the same by the banking organizations. This will also enable the banks to have a fundamental understanding of the activities from which risks originate. This understanding will be essential to evaluate aspects related to the magnitude of the risks, the tenor and the implications they have on the accounting aspects. At any point of time, a bank generally will be exposed to a host of risks emanating from the exposures. However, if the bank considers aggregate values of these risks, without considering each risk independently, there may be improper estimation of the risks due to offsetting. To avoid this, all signs of hidden, economic and competitive exposures are to be considered. This is possible when the bank unbundles the risks involved in each transaction. This is in fact the most critical step where most of the time needs to be spent. Unless the bank identifies and understands the nature of the exposures involved in a transaction, it will not be able to manage them. Further, such unbundling also helps the bank in deciding which risks it will have to manage and which it would prefer to eliminate. The process of unbundling also helps a bank in pricing the risk.

Quantification of Risks: By measuring the risks, the bank is indirectly quantifying the consequences of the decisions taken. If risks are not quantified, the bank will neither be aware of the consequences of its decisions nor will it be in a position to manage the risks. Thus, all risks to which the bank is exposed need to be quantified. Quantification of risks is a crucial task and accurate measurement of the same depends extensively on the information available. The quality of

information coming from various branches, however, depends on the reporting system. The information provided needs to be further evaluated to ensure that there is an effective and ongoing flow of information. Technology and MIS play a crucial role here.

Policy Formulation: The next step will be to develop a policy that gives the standard level of exposures that the bank will have to maintain in order to protect cash flows. Policy is a long-term framework to tackle risk and hence the frequency of changes taking place in it is very low. Setting policies for risk management will depend on the bank's objectives and its risk tolerance levels. The risk levels set by the bank should neither be too high that it goes beyond the bank's capacity to manage it nor should it be too low that the profitability is affected. The bank should decide on a particular risk exposure level only if it aids in achieving the bank's objectives and also if it believes that it has the capacity to manage the risk for a gain. If either of the conditions is not met, the bank will have to try and eliminate/minimize the risk.

Strategy Formulation: A strategy is that which is developed to implement a policy. Clearly, a strategy will then be relatively for a shorter period. Given the exposures and volatilities, a strategy helps in managing these risks. Firstly, the possible options and the risks attached to them are examined in order to know the affect of each option on the cash flows and the earnings. With this information, a strategy will be developed to identify the sources of losses/gains and how efficiently the risks can be shifted to enhance profits while reducing the exposure. Strategies differ widely depending on the nature of exposure, the type of transaction, etc. and will also state the instruments that are to be used to manage exposure, tenors and counterparties.

Monitoring Risk: Laying down strategies will not lead to risk management since risk profile cannot be static. Volatile circumstances may change the risk level of the investment and hence require the banks to restore the same to the set target levels. For instance, the bank takes a long position on a loan of US \$1 mn. At an exchange rate of Rs.43.50, the risk which the bank is ready to take is up to Rs.0.10 variation. In absolute terms this will be Rs.1 lakh. However, the exchange rate goes down by Rs.0.15 due to which the loss to the bank is Rs.1.5 lakh. This is beyond the target set by the bank. In such circumstances, the bank can take a long position in US\$ if it believes that the rate will move up. And in case the rates are expected to go down further, it can either enter into a forward contract or exit from the long position taking up the loss. In either case the bank needs to have a view about the market regarding its future behavior.

Apart from the long-term changes, the exchange rate and the interest rate fluctuations occur on a monthly, fortnightly and even on a daily basis. There should hence be a continuous vigil on the risk profiles. However, the frequency with which the bank can alter strategies or take action to restore these exposure levels to the set targets may not be very high. This is due to the costs that are involved in taking such actions. Considering the above case, to restore the foreign exchange exposure within the set targets, the bank may choose to enter into a forward contract. However, this will involve transaction costs. In such a situation, the bank should decide to go for the transaction only if change in the exchange rate is believed to be long-term. While monitoring of risks should be done on a continuous basis, restoration of the same to the targets should be done after analyzing the extent of fluctuations taking place during a given period and the transaction costs involved in restoring the exposure to the target set. Thus, continuous monitoring helps in eliminating a worst case scenario by identifying those risk levels which have gone beyond the set targets and restoring them to the targeted levels.

While this is the general process for managing any type of risk, by any business firm, for a bank, the risk management process primarily involves Asset-Liability Management (ALM). ALM is discussed elaborately in subsequent chapters.

Box 3

India Risk Management Survey Report 2001 by KPMG

KPMG, one of India's largest professional services organization

(http://www.in.kpmg.com) undertook the first India Risk Management Survey to establish the profile of risk management practices in India's leading organizations. In addition to becoming a benchmark document in India on risk management, this survey is a part of an initiative by KPMG to conduct national surveys on a variety of topics including business ethics, corporate frauds, information security, etc. The key objective of the survey is to determine the overall level of awareness of the importance of risk management amongst the senior management and their attitude towards the critical Risks faced by them.

Importance of an Effective Risk Management Strategy:

Findings of KPMG Survey

How important is effective risk management strategy for achieving the goals and objectives of your organization? Most of us are aware of the importance, but only a few venture to think of effecting steps for the mitigation of perceived risks. In the survey referred above, 80% of respondents believed that an effective risk management strategy is important to achieving the goals and objectives of the organization. None of the respondents indicated that effective risk management is not important at all for their organization. This indicates that the importance of risk management is well understood and appreciated in today's business environment. However, when we look at how many companies have formal risk management policies, the number is a low 20%. Further, only 37% of respondents have conducted comprehensive risk reviews in their organizations.

Referring further to the above survey, only one in five respondents said that they have a formal risk management policy in their organization. This is in strong contrast with the riskiness of businesses, where 70% of respondents felt their business is fairly or very risky. The industry most likely to have a formal risk management policy is financial services (45%) and least likely is consumer products industry (12%). While the majority (67%) of respondents says that they perform strategic risk assessment prior to business planning and undertaking major investments, only 27% use risk-adjusted rates of return to assess investments and new projects.

Do you formally apply strategic long-term risk assessment prior to business and investment planning? Do you risk-adjust your required rate of return? Only 37% of respondents said they have carried out a comprehensive review of risks. The frequency, however, varies significantly by industry. 56% of the organizations in electronics/technology and financial services sector have done such reviews, while only 17% in the construction/engineering and 25% in consumer products sector say they have performed a comprehensive risk assessment. This indicates a partial correlation between the perception of riskiness of business and carrying out a risk assessment.

Has your organization ever carried out an overall, comprehensive review of risks it faces, i.e., do you have a profile of key business risks?

It is surprising to note that almost 40% of the respondents carried out a one-off risk review exercise as against a continuous one. The one-off risk reviews may not prove to be adequate in identifying and managing risks on an ongoing basis in this ever changing and volatile Indian corporate world. Further, just about 40% of the respondents have developed a risk framework for their organization to categorize different types of risks.

Scope of the Risk Management Function: 79% of respondents state that risk management in their organization encompasses market, credit, strategic and operational risks. It is encouraging to note that strategic risk is on the agenda of 92% of the respondents. A breakdown of operational risks reveals that more than 70% of respondents are of the view that operational risks include customer, product, organizational, staff, process and physical risks. Customer risk is perceived to be the most important component of operational risk. Perhaps a result of opening up of markets and easing of import restrictions. Winning and retaining a customer is one of the biggest challenges of any business.

Monitoring of Risk

How frequently are you kept informed about risk performance indicators? A key component of risk management is to have an optimal balance between risk and control. However, very few organizations relate the degree of control to the level of risk. In particular, they have not recently considered which resources are being expended on controls in the light of the specific risks and ability to finance them. This may mean that some low-risk areas may be over-controlled, while some high-risk areas may be under-controlled. Has your organization recently evaluated whether it is over-controlling in the light of your risks and ability to finance them?

Monitoring of risk is viewed as the responsibility of an individual in many organizations. This may be related to the lack of management information on the key performance indicators of risk. Most of the respondents state that monitoring of risk is done as part of periodic management meetings, and also by way of keeping an eye on the competition, updates in technology, change in government policies, movements in markets, foreign exchange rates, etc. Only 49% of the executives receive data on risk, at least on a monthly basis. This means that organizations without real time reporting and a risk-aware culture may be slow to react to changing patterns of risk exposure and loss.

Role of Internal Audit in Risk Management

Internal Audit plays an important role in risk management programmes. While 63% of respondents agree with the statement that it is fairly or very important in risk management, surprisingly, 28% of respondents believe the role of internal audit is largely limited to compliance alone. How important is the role of Internal Audit in your risk management programme? Is the role of Internal Audit mainly...? The Internal Audit profession has undergone a remarkable change over the years with internal audit actively contributing to success of an organization. The Internal Audit mandate today in leading organizations includes creating risk awareness, developing a risk profile in conjunction with management, devising a strategy to manage the identified risks, etc.

Who is Responsible for Risk Management

88% of respondents say that overall responsibility for risk management is at the senior management level including CEO, CFO, COO and Directors. Though it is the top management who has overall responsibility for risk management, lower and middle management also need to manage risks at their levels. Leading edge organizations across the world are reaping the competitive advantage that arises from a culture where the tone from the top ensures that risk management is a genuine competency of all their people. Most organizations do not have an executive Risk Manager or a Risk Management Committee. For an organization to manage its risks, it is imperative that the responsibility for risk management should be absolutely clear. Further, there should be tiers or 'lines of defense' to ensure that its entire people are actively managing risks at their levels. SEBI has recently, through incorporation of Clause 49 in the listing agreement, widened the responsibility of Audit Committees to include review of risk management policies.

The survey categorically proves that risk-awareness if felt by all, but very few proceed further to earnestly conduct a complete risk-analysis and to evolve into a sound policy of risk control and risk-management. This may be due to the fact that Indian business and industry have come to grips with the subject quite lately and recently.

Risk Control Measures

Risk management identifies future risks in order to plan control measures to prevent its occurrence, or to control the extent of damage, if it were to occur. Obtaining insurance cover is a generally followed risk covering method against all known and identifiable risks, like loss in transit of goods in domestic trade, political and commercial risks in export business, fire-risks etc. Financial risks are covered by a process known as hedging. Hedging helps to reduce risks associated with market exposure by taking a counter position in the futures market, i.e. buy stock, sell Nifty futures etc. The development of derivatives market is a device for hedging different kinds of financial risks.

Another innovative tool for hedging financial risks is called "Interest-rate-swaps". This is explained as under.

The Corporations in which individual investors place their money have exposure to fluctuations in all kinds of financial prices, as a natural consequence of their operations. Financial prices include foreign exchange rates, interest rates, commodity prices and injustice prices. The changes in the financial prices cause uncertainty in the projected revenues to the corporate sector. And the companies often attribute the cause in decline in incomes to falling commodity prices, raising interest rates, declining home currency value. Necessity is the mother of invention. Human quest to find the solution continues. In this process various financial instruments were invented. Interest rate swap is one of the risk tools that help a corporate to hedge from uncertainties of the interest rate fluctuations.

The Reserve Bank of India has taken a bold step towards rupee derivative trading allowing banks/financial institutions to hedge against interest rate risks through the use of interest rate swaps and forward rate agreements.

Similarly the risk of exchange-rate fluctuations can be covered by entering into forward contract for buying/selling the foreign currency.

Source: ICFAI Research Center.

EMERGENCE OF RISK MANAGEMENT IN BANKS

The banking environment consists of numerous risks that can impinge upon the profitability of the banks. These multiple sources of risk give rise to a range of different issues. In an environment, where the aspect of the quantitative management of risks has become a major banking function, it is of lesser importance to speak of the generic concepts. The different types of risks needs to be carefully defined and such definitions provide a first basis for measuring risks on which the risk management can be implemented.

There have been a number of factors that can be attributed to the stabilisation of the banking environment in the nineties. Prior to that period, the industry was heavily regulated. Commercial banking operations were basically restricted towards collecting resources and lending operations. The regulators were concerned by the safety of the industry and the control of its money creation power. The rules limited the scope of the operations of the various credit institutions and limited their risks as well. It was only during the nineties that banks experienced the first drastic waves of change in the industry. Among the main driving forces that played a crucial role in the changes were the inflating role of the financial markets, deregulation of the banking sector and the increase in competition among the existing and emerging banks.

On the foreign exchange front, the floating exchange rates accelerated the growth of uncertainty. Monetary policies favoring high levels of interest rates and stimulating their volatility emerged. For countries, especially european countries, where intermediation was by far the major channel of financing the economy, disintermediation increased at an accelerated pace. Those changes turned into new opportunities and threats for the players.

These waves of change generated risks. Risks increased because of new competition, product innovations, the shift from commercial banking to capital markets, increased market volatility, and the disappearance of old barriers which limited the scope of operations for the various financial institutions. There was a total and radical change in the banking industry. Here it is worth mentioning that this process has been a continuous one and has taken place in an orderly manner. Thus it is no surprise that risk management emerged strongly at the time of these waves of transformation in the banking sector.

BANKING RISKS

As stated elsewhere, risks are usually defined by the adverse impact on profitability of several distinct sources of uncertainty. Risk measurement requires that both the uncertainty and its potential adverse effect on profitability be addressed. Let us now try to focus on the risk framework purely from the perspective of a banker.

Risk Framework

The variours risks associated with banking may be defined as below and these definitions have the advantage of being readily recognizable to bankers.

- i. **Solvency Risk:** Risk of total financial failure of a bank due to its chronic inability to meet obligations.
- ii. **Liquidity Risk:** Risk arising out of a bank's inability to meet the repayment requirements.
- iii. Credit Risk: Risk of loss to the bank as a result of a default by an obligator.
- iv. **Interest Rate Risk:** Vulnerability of net interest income, or the present values of a portfolio, to changes in interest rates.
- v. **Price Risks:** Risk of loss/gain in the value of assets, liabilities or derivative due to market price changes, notably volatility in exchange rate and share price movements.
- vi. **Operating Risks:** Risks arising from out of failures in operations, supporting systems, human error, omissions, design fault, business interruption, frauds, sabotage, natural disaster etc.,

WHAT ABOUT ALL THE OTHERS?

Where do derivatives (swaps, options, futures, etc.) and the *systemic risk* with which they are so closely associated figure? The answer is that derivatives, being exactly that, reflect the risk characteristics of the underlying instruments (i.e., from which they derive), although at times in more complex form. While Derivative risk does not exist in isolation but is found spread across the spectrum of risks associated with derivative contracts, systemic risk is viewed in the liquidity risk context. Some risk management guidelines for derivatives are discussed in detail in later chapters.

The umbrella term 'market/position risk', which bridges some of the interest rate and price risks mentioned above, has found favor as a conceptual counterpoint to credit risk.

Added to these risks are legal risk, regulatory risk, event risk, portfolio concentration risk, behavioral risk, and/or various other risks that can be subsumed within those risks that are mentioned here.

For instance, legal risk seems to forebode trouble as in the UK local authorities, swaps debacle of the early 1990s, where the authorities were found lacking the contractual powers to be legally liable as swaps counterparties. Alternatively, it is equally arguable that to ascertain contractual powers of counterparties is a standard credit risk procedure, that is stressed in any lending manual.

Introduction to Risk Management

There is a dilemma whether or not to give law and regulation generic risk categories of their own. It is absolutely necessary that documentation needs to be unassailable, that laws and supervisory regulations have to be properly interpreted and complied with, that changes in laws and regulations may expose banks and their customers and the fact that the society we live in is a litigious one. In the light of these, the alternative available is to treat the legal regulatory problems as and when they arise within the risks listed above, with credit risk being the most common field.

Event risk though sounds simple relates to a sudden and unexpected slippage in credit grading suffered either by a bank or when a major counterparty or issuer to whom the bank is exposed. While the former undermines the bank's profitability by raising its interest costs and curtailing its ability to transact certain deals like high grade swaps, the latter could expose the bank to interest rate or price risks.

A common sub-division of operating risks is business event risk. Event risk is too mercurial to be marked as one of the primary banking risks.

Portfolio concentration risk, though not a necessary risk type in its own right, has widespread disciplinary applications and is an integral part of credit risk management. Fraud, error and other human factors like key personnel risk are part of behavioral risk and fall within operating risks.

The other risks cited above do not exist in watertight compartments but can spill over resulting in multiple effects. When there are poor credit risks, a liquidity crises may arise due to a run on deposits. This chain of events was seen in the failure of continental Illinois (1984), Bank of New England (1991) and countless others in the banking history. Also, banks are exposed to price risk losses on failed forward contracts due to defective credit appraisal. Speculation on derivatives can turn an erstwhile creditworthy customer into a bad debtor and also a possible litigant against the bank.

'Pure' and 'Speculative' Risk

A distinction needs to be drawn between the so-called 'pure' (or 'static') risk and 'speculative' (or 'dynamic') risk. These terms are borrowed from the insurance industry, and bankers may find it more helpful to substitute for the former 'one-way risk' (all downside) and for the latter 'two-way risk' (possible upside as well as downside outcomes). In any case, the distinction has been modified by the relatively new concept of expected loss: this makes it possible by definition to do either better or worse than expected, which turns many negative risks into a two-way bet even if the upside is not always 'profit' as we once knew it. Subjecting our banking risks to this revised test, we can tabulate the findings as follows:

- i. Solvency risk: One-way (downside). Solvency is 'par' and insolvency a disaster.
- ii. Liquidity risk: One-way. Liquidity is a necessary condition and not a bonus.
- iii. Credit risk: Hybrid. One-way in the sense that the obligor will not pay more than face value or what is legally due, and may not materialize, in which case you 'win'. Loan trades could also produce winners as well as losers through revaluations. Conversion of hard core debt into shares changes the risk to a price risk, which is two-way.
- iv. Interest rate risk: Two-way. Risk is both upside and downside.
- v. Price risks: Two-way. Gains or losses are possible.
- vi. **Operating risks:** Mainly one-way, apart from serendipity, the occasional fluke that can yield a windfall gain. Can arguably be classified as two-way in those cases where an expected loss does not materialize (as for credit risk above).

Credit Risk

In simple terms credit risk can be defined as the risk that customers default, or rather fail to comply with their obligation to service the debt. Credit risk can also be stated as the risk of a decline in the credit standing of counterparty. Such a decline in the value of the debt does not connote default, but implies that the probability of default increases. Credit risk is of enormous importance since the default of a small number of important customers can generate large losses, which can lead to insolvency. Credit risk is normally monitored through classical methods in banks. This will be dealt in detail in the later part of the book. The system of limits imposes a ceiling on the amount lent to any customers within a single industry or customers in a given country. The delegation at various levels of the bank also decides, who is responsible for monitoring of credit risks. It is important to note that the various market transactions also generate credit risk. The loss in the event of default depends upon the value of the instruments and their liquidity.

Liquidity Risk

Liquidity risk is considered to be a major risk in the banks. It is the risk of loss arising due to adverse changes in the cash flows of transactions. It can be defined in different ways, such as, extreme illiquidity, the safety cushion provided by the portfolio of liquid assets, or the ability to raise funds at a normal cost.

The extreme illiquidity more often results in bankruptcy of the bank. Thus, it can be said that liquidity risk is a fatal risk. However, it is also to be noted that such extreme conditions are often the outcome of other kinds of risks. For instance, important losses, due to the default of a big customer, can raise liquidity issues and doubts as to the future of the organization. This kind of situation may be sufficient enough to generate massive withdrawals of funds or the closing of credit lines by other institutions which try to protect themselves against a possible default.

Another definition of liquidity risk is that the short-term asset values are not sufficient to match short-term liabilities. From this standpoint, liquidity is the safety cushion which helps to gain time under difficult conditions. Liquidity risk also means having difficulties in raising funds. In such circumstances liquidity risk relates to the inability to raise money at a reasonable cost. The cost of liquidity can increase due to transitory liquidity shortages in the market. Market liquidity has an impact on the cost of funds for all players. The indicators of market liquidity include the volume of transactions, the level of interest rates and their fluctuations, and the difficulties encountered finding counterparty.

Liquidity risk is a normal outcome of standard transactions. These transactions tend to generate a maturity gap between assets and liabilities. Often, banks collects short-term resources and lend long-term. Given this gap between maturities, there exists always a liquidity risk and a cost of liquidity.

Interest Rate Risk

Interest rate risk is defined as the risk of the fall in the earnings due to the movements of interest rates. Most of the balance sheet items of banks generate revenues and there are costs which are attached to the interest rates. Anyone who lends or borrows is subject to interest rate risk. The lender who is earning a variable rate of interest has the risk of experiencing a reduction in his future revenues through a decline in interest rates. On the other hand, the borrower paying a variable rate faces higher costs when interest rate increases. Both these positions are risky since they generate revenues or expend costs indexed to market rates. In some cases, the rate of outstanding loans is directly related to some market rate.

An added source of interest rate risk is embedded in implicit options in banking products. A common example is that of the prepayment of loans which carry a fixed rate. The borrower can always repay the loan and borrow at a new rate, a right that he will exercise when interest rates decline substantially. It is to be also noted that deposits carry options as well, since they can be transferred to term deposits earning revenues when interest rates increase. Optional risks are often called indirect interest rate risks as they do not arise directly from a change in interest rate. On the other hand, they result from the behavior of customers who compare the benefits and the costs of exercising options embedded in banking products, and make a choice depending upon market conditions.

Market Risk

In the simplest terms, market risk can be defined as the risk of adverse deviations of the mark-to-market value of the trading portfolio during the period that is required to liquidate the transactions. Existence of market risk can be for any period of time. Earnings for the market portfolio are the Profits and Losses (P&L) arising from transactions. The assessment of market risk is based on the instability of market parameters: interest rates, stock exchange indexes, exchange rates. The instability is measured by market volatilities. With the help of the volatilities of market parameters and sensitivities of instruments, the changes in market value can be quantified.

The component of market risk can be divided into several dimensions. One dimension is the liquidity risk that forms an important component in all markets where the low volume of transactions makes it difficult to find a counterparty. Another dimension is the presence of volatility risk arising from the fluctuations over time of the instability of the market parameters.

Foreign Exchange Risk

Currency risk arises due to changes in exchange rates. Variations in earnings are caused by the indexation of revenues and charges to exchange rates, or of the values of assets and liabilities denoted in foreign currencies. Foreign exchange risk is one of the major component of market risk. For market transactions, foreign exchange rates form a part of market parameters whose variations are considered together with other market parameters.

A more traditional approach of dealing with foreign exchange risk is to manage risk on a currency-by-currency basis for the banking portfolio. Other techniques that can be used to measure the totality of interest rate risk are dealt in the later chapters.

Solvency Risk

Solvency is the end result of available capital and of all risks taken: credit, interest rate, liquidity, market or operational risks. Thus solvency risk is the risk of being unable to cover losses, generated by all types of risks, with the available capital. Solvency risk can thus be defined as the risk of default of the bank. It is also identical to the credit risk incurred by the counterparties of the bank.

Operational Risk

Operational risks result out of the improper functioning of the information systems, of reporting systems, and of the internal risk monitoring rules. Operational risks are generally observed at two different levels – at the technical level (in cases where the information system, or the risk measures, are deficient) and at the organizational level, (that deals with the reporting and monitoring of risk, and all related rules and policies).

Technical Risks

Technical risks cover a large number of specific risks. Primarily, they include the errors in the recording process of transaction, deficiencies of information system and the absence of adequate tools for measuring risks. Operational risk is of major importance for delivery and settlement. The existence and the importance of such risks are highly dependent on the technical systems used to settle transactions, which have various levels of safety embedded in their designs.

Country Risk

Country risk arises due to cross border transactions that are growing dramatically in the recent years owing to economic liberalization and globalization. It is the possibility that a country will be unable to service or repay debts to foreign lenders in time. It comprises of transfer risk arising on account of the possibility of losses due to restrictions on external remittances; Sovereign Risk associated with lending to government of a sovereign nation or taking government guarantees; Political Risk when political environment or legislative process of country leads to the government taking over the assets of the financial entity (like nationalization, etc.,) and preventing discharge of liabilities in a manner that had been agreed to earlier; Cross border risk arising on account of the borrower being a resident of a country other than the country where the cross border asset is booked; Currency Risk, a possibility that exchange rate change, will alter the expected amount of principal and return on the lending or investment.

In the above backdrop there can be a situation in which seller (exporter) may deliver the goods, but may not be paid or the buyer (importer) might have paid the money in advance but was not delivered the goods for one or the other reasons. As per the RBI guidance note on Country Risk Management published recently, banks should reckon both fund and non-fund exposures from their domestic as well as foreign branches, if any, while identifying, measuring, monitoring and controlling country risk. It advocates that banks should also take into account indirect country risk exposure. For example, exposures to a domestic commercial borrower with large economic dependence on a certain country may be considered as subject to indirect country risk. The exposures should be computed on a net basis, i.e., gross exposure minus collaterals, guarantees etc. Netting may be considered for collateral guarantees issued by countries with a lower risk and may be permitted for the banks dues payable to such countries.

RBI expects banks to eventually put in place appropriate systems to move over to internal assessment of country risk within a prescribed time frame. The system should be able to identify the full dimensions of country risk as well as incorporate features that acknowledge the links between credit and market risks. Banks should not rely solely on rating agencies or other external sources as their only country risk-monitoring tool. Banks are also advised by RBI to set country exposure limits and monitor such exposure on weekly basis before eventually switching over to real time monitoring. They are also expected to disclose the "Country Risk Management" policies in their Annual Report by way of notes.

Environmental Risk

As the years roll by and technological advancement continues, expectation of the customers change and enlarge. With the economic liberalization and globalization, an increasing number of national and international players are operating in the financial markets, particularly in the banking field. This provides the platform for environmental change and exposes the bank to the environmental risk. Thus, unless the banks improve their delivery channels, reach customers, innovate their products that are service oriented, they are exposed to the environmental risk resulting in loss in business share with the consequential impact on profits.

Contingency Risk

The off-balance sheet items such as guarantees, letters of credit, underwriting commitments, etc., will give rise to the contingency risk. One important feature of the various risks of the banks is that there is a definite linkage between them. For example, if the bank charges its client a floating rate interest, in situations of increasing interest rate scenario, the bank's interest rate risk will be lower. This enhances the payment obligation of the borrower. Other things remaining constant, the default risk increases. If the client is not able to bear the burden of the rising

rates, there may be a possibility of default. Thus, there may be instances where the interest rate risk may eventually lead to a credit risk. Further, the credit risk itself is closely associated with the forex risk in case of the borrowers whose earnings are extremely influenced by exchange rates.

Enterprise-wide Strategic Risk Management

When speaking of the risk management process, it is essential to take a holistic view. This can be done when one views risk management from the framework of "Enterprise-wide Strategic Risk Management".

In today's world, the most advanced companies are evaluating and quantifying their risk and performance on an enterprise-wide basis. They do this not only in order to best control their losses and manage risk on a firm-wide basis, but also to create a competitive advantage in the market place. They integrate enterprise-wide strategic risk management into both their strategy and their culture. Enterprise-wide strategic risk management is a multi-staged process that begins with the quantification and timely reporting of the total risk in the overall firm. This includes quantification of market (including currency and interest rate), credit, liquidity, and operational risks. Limitations on the amount and type of risk carried by the firm are then established and are a function of the capital available to the firm and the firm's strategic goals. These are typically expressed as Value at Risk, Earnings at Risk, or Profit at Risk limits.

The risks in the overall firm are then adjusted to bring them in tune with the parameters or limits defined by the firm's strategic goals. This is followed by monitoring the risk in the firm, which is then quantified, and corrected on a daily or weekly basis to ensure that the risk profile of the firm remains aligned with the strategic vision of the firm.

Regular risk-adjusted performance evaluations ensure that the risk capital allocated to each business is earning the minimum targeted risk-adjusted returns. If not, it should be reallocated to areas where it can earn higher risk-adjusted returns.

This process ensures providing timely, accurate, and comparable quantitative, enterprise-wide risk information to the senior management, enabling ultimately rapid risk management decisions to be made and facilitating the mitigation of losses that can be minimized.

The above mentioned steps aid in the allocation of scarce and expensive capital to vital areas of the firm that produce the highest risk-adjusted returns over the long-term. This enhances shareholder value, smoothes earnings volatility, and can lower the firm's cost of capital thereby creating a competitive advantage.

Till now we have surveyed the basic sources of risk encountered in the banking business. Problems related to credit, liquidity, and fraud are the most common primary causes of bank failures, and combinations of these misfortunes are often evident. Capital inadequacy for the risks being run is an almost universal secondary cause, and prelude to banking insolvency. The above risks are highlighted, but in truth any of the other categories of banking risks discussed are themselves capable of precipitating a collapse; otherwise they would not merit a place on the generic list.

The next chapters will examine each of these risk categories in turn, suggesting how to monitor and manage them in the light of professional experience and scientific analysis. The aim always must be to optimize the risk/reward relationship, avoid shocks (from excessive exposure to particular sources of risk), and provide a prudent cover for expected and unexpected loss. Getting this right is the key to survival and consistent success of a banking entity.

SUMMARY

- The word risk may have different meanings as per the user. For some it is "financial" and for someone else "an event or commitment to generate brand image". In the dark ages risk was associated with God. Risk is inherent component of life whether it is in Business or in the personal life.
- Risk can be defined as any uncertainty about a future event that threatens the organization's ability to accomplish its mission. No business exists without risks or has zero risk-orientation. Risk management cannot be eliminated but enables the organizations to bring it to manageable proportions. Risk management basically is a five-step process, involving (i) Avoidance, (ii) Loss control, (iii) Separation, (iv) Combination and (v) Transfer. One can move forward only by taking risks. Knowledge will grow where people are able to take risks.
- The management of an organization has to decide whether they want to pursue their risk management function in order to 'manage' or 'reduce' risks. In the context of the risk management function, identification and management of risk is more prominent for the financial services sector and less so for consumer products industry. Solvency and liquidity are the two irreducible conditions upon which society allows the banking industry to gear up. Problems with credit, liquidity, and fraud are the most common primary causes of bank failures, and combinations of these misfortunes are often seen.

<u>Chapter II</u> Managing Credit Risk

After reading this chapter, you will be conversant with:

- Credit Risk
- Drivers of Credit Risk
- Credit Rating
- Capital Adequacy Requirements
- BIS Risk-Based Capital Requirement Framework
- Traditional Credit Risk Measurement Approaches
- Different Models of Credit Risk

CREDIT RISK

Credit Risk is defined as the failure of a counterparty of a financial agreement to meet its obligations inaccordance with the decided terms. This counterparty could be anyone ranging from an individual borrower to a corporate or any other statutory body. And accordingly, credit risk also comes in different forms like personal finance, vehicle loans, derivatives, interest swaps, infrastructure loans – the list is long. Not just the corporates, but also the financial institutions are well aware of the benefits and the need for managing credit risk. In the era of the Enron Debacle and WTC - 9/11, where companies are prone to various risks, the institutions giving credit to the companies have to be more alert in granting and managing credit. It is very necessary to take into consideration the relationship between credit risk and other forms of risk as they bear an impact on the overall credit paying capacity of the borrower.

Effective management of credit risk is vital for the long-term success of any organization. Companies have felt the need to identify, measure, monitor and control credit risk as well as to be capable enough to fight against any credit contingency that may crop up in due course of time.

Credit risk is much more difficult to manage than any other risk created because of the external environment. This is because the risk of external environment is momentary. It can be controlled within a period of time. But credit risk remains till the business is in existence. It involves two basic questions.

- What is the probability of loss occurring due to credit risk?
- What is the amount of loss the firm will have to bear in case of default?

Lack of sufficient and reliable data and difficulty in keeping a track of actual default probabilities are the major factors hampering efficient credit risk management. Again, it is very hard to keep a record and measure default correlations. As a result, due to cumulative effect of the above said reasons, it becomes very difficult to model credit risk.

Loans and advances constitute almost sixty per cent of the assets side of the balance sheet of any bank. As long as the borrower pays the interest and the principal on the due dates, a loan will be considered as a performing asset. The problem however, arises once the payments are delayed or defaulted and such situations are very common occurrences in any bank. Delays/defaults in payments affect the cash flow forecasts made by the bank and further result in a changed risk profile, as the bank will now have to face an enhanced interest rate risk, liquidity risk and credit risk.

Lending – from credit cards to corporate loans – is the largest and most obvious source of credit risk. But credit risk in some guise exists throughout bank activities, both on and off the balance sheet – from acceptances, interbank transactions, trade financing and derivatives trading to guarantees and settlement.

When there is a counter-party failure in performing the repayment obligation on due date, it gives rise to low quality assets which in turn lead to credit risk. Like the interest rate risk and the liquidity risk, credit risk is also an inherent feature of any firm that is into the business of lending funds either to individuals or to corporates.

A corporation executes an interest rate swap with counterparty. If interest rates move in the corporation's favour, the counterparty will owe the corporation a net obligation. Because the counterparty could fail to perform on such an obligation, the corporation faces pre-settlement credit risk. Credit risk refers to the risk that a borrower or counterparty will fail to meet its obligations.

Effective management of credit risk involves the following key principles:

- Evaluation,
- Pricing,
- Monitoring.

By evaluating and sanctioning the proposal by appropriately pricing it, the credit risk management policy has indeed performed only half its job. While the measurement of the various ratios and other financial analyses is done with great accuracy, it is not so with their interpretation. Experience is needed to scrutinize all the credit information and interpret the same. However good the analysis may have been, the bank will be in no position to distinguish a good borrower from a bad borrower, who has no intention of repaying the loan. Despite all the caution, bad loans do creep into the bank's accounts. Thus, evaluation and pricing decisions should be followed up with periodic review of the account and the credit rating of the borrower. Any fall in the rating will increase the credit risk. Credit risks persist from the time the loan is granted throughout its life period and continuous review during this period will help in the early detection of the problem loans.

Credit risk – the potential that a borrower will fail to meet his or her obligations in accordance with the agreed terms – is one of the core risks faced by a bank. The objective of credit risk management is to maximize the bank's return within acceptable credit risk parameters. Understanding, measuring and managing credit risk is the key to success and profitability for a bank – a 2% write-off of a big corporate loan can wipe out a bank's yearly profits. So, how does a bank quantify its credit risk? Banks have traditionally projected financial statements to assess the credit risk of a company. A 'credit appraisal' involves industry and company analysis, assessment of management quality, security cover and other factors to arrive at an overall lending decision.

While the importance of these subjective analyses cannot be underestimated, banks do not have an overall risk measure indicating the probability of default. A number of leading companies have admitted to mis-stating their accounts, giving a misleading impression of their status. Closer home in India, where accounting norms are far more relaxed, the scenario is more worse. When financial statements are so unreliable, the traditional methods of assessing credit risk based on subjective financial statement analysis must give way to more objective and scientific methods. The other option for a bank is to rely on credit rating agencies.

Box 1: The Need to Manage the Credit Risk

Credit risk is most simply defined as the potential that a bank borrower will fail to meet its obligations in accordance with agreed terms. The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. The effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long-term success of any banking organization. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between credit risk and other risks.

For most banks, loans are the largest and most obvious source of credit risk; Banks are increasingly facing credit risk in various financial instruments other than loans, which include acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions.

The process of Loan review, administration, and management (LRM) is becoming a burning issue among commercial lenders because it is the single largest source of labor cost, risk, and compliance issues. Currently, LRM is a largely manual and complicated exercise, managed in the field, using unstructured and difficult to gather data and costs huge amount of money. Banks also experience an increase in exposure to risk because analysis is slow, subjective, and difficult to document and audit.

Source: ICFAI Research Team.

CREDIT RATING

Credit rating is the main tool, which helps in measuring the credit risk and facilitates the pricing of the account. It gives vital indications of weaknesses in the account. It also triggers portfolio management at the corporate level. Therefore, banks should realize the importance of developing and implementing effective internal credit rating systems, and also recognize the role such systems play in credit risk management. It involves evaluating and assessing an institution's risk management, capital adequacy, and asset quality.

To ensure proper administration of their various credit risk-bearing portfolios the banks must have the following:

- a. A system for monitoring the condition of individual credits, and determining the adequacy of provisions and reserves.
- b. An internal risk rating system in managing credit risk. The rating system should be consistent with the nature, size and complexity of a bank's activities.
- c. Information systems and analytical techniques that enable the management to measure the credit risk inherent in all on- and off-balance sheet activities. The management information system should provide adequate information on the composition of the credit portfolio, including identification of any concentrations of risk.
- d. A system for monitoring the overall composition and quality of the credit portfolio.

In addition, while approving loans, due consideration should be given to the integrity and reputation of the borrower or counterparty as well as their legal capacity to assume the liability. Once credit-granting criteria are established, it is essential for the bank to ensure that the information it receives is sufficient to make proper credit-granting decisions. This information will also serve as the basis for rating the credit under the bank's internal rating system.

Internal credit risk ratings are used by banks to identify gradations in credit risk among their business loans. For larger institutions, the number and geographic dispersion of their borrowers makes it increasingly difficult to manage their loan portfolios simply by remaining closely attuned to the performance of each borrower. To control credit risk, it is important to identify its gradations among business loans, and assign internal credit risk ratings to loans that correspond to these gradations. The use of such an internal rating process is appropriate and, indeed, necessary for sound risk management at large institutions. The long-term goal of this analysis is to encourage broader adoption of sound practices in the use of such ratings and to promote further innovation and enhancements by the industry in this area.

Internal rating systems are primarily used to determine approval requirements and identify problem loans, while on the other end they are an integral element of credit portfolio monitoring and management, capital allocation, pricing of credit, profitability analysis, and detailed analysis to support loan loss reserving. Internal rating systems being used for the latter purposes should be significantly richer and more robust than systems used for the former purposes. As with all material bank activities, a sound risk management process should adequately illuminate the risks being taken and apply appropriate controls to allow the institution to balance risks against returns and the institution's overall appetite for risk, giving due consideration to the uncertainties faced by lenders and the long-term viability of the bank.

	Credit Rating Parameters		Score
1.	CURRENT RATIO		
	1.50 and above		10
	1.33 to 1.49		8
	1.25 to 1.32		6
	1.16 to 1.24		4
	1.00 to 1.15		2
	Below 1.00		0
2.	TOTAL DEBT EQUITY RATIO		
	2.5 and below		5
	2.6 to 3.5		4
	3.6 to 5.0		3
	5.1 to 7.0		2
	7.1 and above		1
3.	DPG/TERM LOAN/LC/INTEREST COMMITMENTS		-
0.	Timely repayment on due date		5
	Delayed navment up to 30 days	••	3
	Delayed payment up to 90 days	••	2
	Delayed payment over 90 days	••	0
4	COMPLIANCE WITH TERMS & CONDITIONS OF	••	0
ч.	SANCTION INCLUDING DOCUMENTATION		
	REGISTRATION OF CHARGES		
	Complied with promptly		5
	Complied with delay	••	3
	Not complied	••	0
5	INVENTORY/RECEIVABLE NORMS		0
5.	Overall current assets within the sanction level _		
	With 10% deviation		5
	With 11% to 20% deviation	••	3
	With 21% to 30% deviation		1
	With more than 30% deviation	••	0
6	SUBMISSION OF MSOD/OIS/STOCK	••	0
0.	STATEMENTS/RENEWAL DATA		
	Timely submission		5
	Submission within reasonable time	••	3
	Delayed/irregular submission	••	0
7	ACHIEVEMENT OR PROJECTED SALES	••	0
<i>,</i> .	Achievement of 90% and above		5
	Achievement of 75% to 89%	••	2
	Achievement of 74% to 51%		1
	Achievement of 50% and below		0
8	SUPPORTED BY COLLATERAL SECURITY		0
0.	INCLUDING 2nd CHARGE OVER FIXED ASSETS		
	Security coverage.		
	50% and above		5
	25% to 49%	••	5 4
	24% and below		+ 1
9	SUPPORTED BY ANCILLARY INCOME/DEPOSIT		1
).	PATRONAGE		
	Fairly supported		5
	Averagely supported		3
	Less than average		1
	Total Score	•	50
l			50

Table 1: A Credit Rating Model adopted by one of the Nationalized Banks

Percentage Scored		Credit Rating	
90% and above score	A+++	To be referred to Central Office	
90% and above score	A++	To be referred to Central Office	
90% and above score	A+		
80% to 89% score	А	Scoring is to be done by the branches and	
70% to 79% of score	В	authority with full details of working	
Less than 70% scored	С	autionty with full details of working.	

Table 2: Credit Rating as per the Scoring Pattern

Based on the historical data which is both financial and non-financial a score is arrived at. The borrower is then classified into different classes of credit rating based on the score which is used to determine the rate of interest to be charged.

The borrower's credit rating method used above is only one such model. Based on the information available, a detailed and more comprehensive model can be developed by banks.

Banking organizations should have strong risk rating systems. These systems should take proper account of gradations in risk and the overall composition of portfolios in originating new loans, assessing overall portfolio risks and concentrations, and reporting on risk profiles to directors and management. Moreover, such rating systems also should play an important role in establishing an appropriate level for the allowance for loan and lease losses, conducting internal bank analysis of loan and relationship profitability, assessing capital adequacy, and possibly performance-based compensation.



Figure1: Risk Rating Processes

Review processes

Source: Federal Reserve Bulletin, November 1998.

Credit risk ratings are designed to reflect the quality of a loan or other credit exposure, and thus – explicitly or implicitly – the loss characteristics of that loan or exposure. In addition, credit risk ratings may reflect not only the likelihood or severity of loss but also the variability of loss over time, particularly as this relates to the effect of the business cycle. Linkage to these measurable outcomes gives greater clarity to risk rating analysis and allows for more consistent evaluation of performance against relevant benchmarks. In documenting their credit administration procedures, institutions should clearly identify whether risk ratings reflect the risk of the borrower or the risk of the specific transaction.

The rating scale chosen should meaningfully distinguish gradations of risk within the institution's portfolio, so that there is clear linkage to loan quality (and/or loss characteristics). To do so, the rating system should be designed to address the range of risks typically encountered in the underlying businesses of the institutions. Prompt and systematic tracking of credits in need of such attention is an essential element of managing credit risk. Risk ratings should be reviewed by independent credit risk management or loan review personnel both at the inception and also periodically over the life of the loan.

In view of the diverse financial and non-financial risks confronted by banks in the wake of the financial sector deregulation, the risk management practices of banks have to be upgraded by adopting sophisticated techniques like VaR, Duration and Simulation and adopting internal model-based approaches as also credit risk modeling techniques. Let us briefly discuss the credit risk rating models used by the banks.

With the introduction of prudential norms for income recognition, assets classification and provisioning, banks have become quite sensitive and are taking all possible steps to strengthen their assets acquisition and monitoring systems. There is also a growing awareness to bring down non-performing assets as they have an adverse impact on their profitability due to de-recognition of interests as well as requirement of heavy loan loss provisions on such assets. Therefore, it would be prudent for banks to manage their assets in such a manner that they always remain healthy, generate sufficient income and capable of repayment/recovery on the due dates. Management of performing/non-performing assets in banks has become an 'art as well as a science' and virtually 'a battle of wits' between the banker and the borrower with the latter demanding write off or at least a major sacrifice from the banker's side irrespective of whether he or she is in a position to pay or not.

When making a credit granting decision, banks review credit applications and credit reports with respect to financial risk. Once lenders make a "yes" decision, they review the credit reports of their customers on a regular basis as they continue to manage their financial risk. This process scans credit reports for certain risk characteristics as defined by the lender. Some lenders, for example, monitor whether or not all of a consumer's payments are on time. Others look at account balances in relation to the total credit limit. Some lenders review their accounts frequently. Others review accounts once a year. Account monitoring also allows lenders to manage the business risk of extending credit in a better way.

Banks pool assets and loans, which have a possibility of default, and yet provide the depositors with the assurance of redemption at full face value. Credit risk, in terms of possibilities of loss to the bank, due to failure of borrowers/counterparties in meeting their commitments, is likely to hamper the capability of the bank to meet its commitment to the depositors. Credit risk is the most significant risk, more so in the Indian scenario where the NPA level of the banking system is significantly high. Its importance may be understood from the fact that during the Asian financial crisis, non-performing loans in Indonesia, Malaysia, South Korea and Thailand soared to over 30% of total assets of the financial system. The management of credit risk through an efficient credit administration is thus a prerequisite for long-term sustainability/profitability of a bank. A proper credit administration reduces the incidence of credit risk.

Credit risk depends on both internal and external factors. Some of the important external factors are state of economy, swings in commodity prices, foreign exchange rates and interest rates, etc. The internal factors may be deficiencies in loan policies and administration of loan portfolio covering areas like prudential exposure limits to various categories, appraisal of borrower's financial position, excessive dependence on collaterals, mechanism of review and post-sanction surveillance, etc.

The key issue in managing credit risk is to apply a consistent evaluation and rating system to all investment opportunities. Prudential limits need to be laid down on various aspects of credit viz., benchmarking current ratio, debt-equity ratio, profitability ratio, debt service coverage ratio, concentration limits for group/single borrower, maximum exposure limits to industries, provision for flexibilities to allow variation for very special features. Credit rating may be a single point indicator of diverse risk factors. Management of credit risk in a bank will require alertness on the part of the staff at all the stages of credit delivery and monitoring process. Lack of such standards in financial institutions would increase the problem of increasing loan write-offs. In 2001, approximately 1.5 million bankruptcy petitions were filed in the US. How can an institution be sure that its collateral is totally protected in the event of bankruptcy by the borrower? The bank can ensure this through effective credit rating and loan documentation.

Macro Level Credit Risk Management – CAR Model

Credit risk can be monitored both at the micro and the macro level. At the micro level it involves using Non-Performing Assets (NPA Model) and quantifying the credit risk (Please see Appendix V). To have a broader outlook on the credit risk position, a macro level approach can be adopted using the Capital Adequacy Ratio (CAR). The capital adequacy of the bank which is the ratio of its capital to its Risk Weighted Assets (RWAs) comments on the extent to which the possible losses can be absorbed by the capital. Generally, when everything else fails, the ultimate defense against credit risk that a bank possesses will be its equity capital or net worth. If earnings turn into operating losses, the equity capital account absorbs those losses, giving management the time to react to the problem. Thus, the higher the CAR the better it is for the financial institution. Mathematically, the relationship between the CAR and the risk weighted assets can be expressed as follows:

$$CAR = \frac{C}{RWA} \qquad \dots (1)$$

Where,

C = Capital, RWA = Risk Weighted Assets.

Since, the RWA is the product of the asset to its risk weight we can express equation (1) as follows:

$$CAR = \frac{C}{A \times RWA} \qquad \dots (2)$$

$$= \frac{C}{A} \times \frac{1}{ARW} \qquad \dots (3)$$

Where,

ARW = Average Risk Weight.

The inverse relation between the CAR and the risk weighted assets can be observed in equation (3). If a bank has more risky assets on its portfolio, then its capital adequacy will be lower implying greater credit risk exposure. The vice-versa holds true when the bank adopts a more conservative approach in maintaining its asset portfolio.

Illustration 1

Synergy Banking Services Ltd. (SCSL) has an asset base of Rs.1,000 crore out of which, 60 percent carry 100 percent risk weight, 30 percent carry zero percent risk weight and the remaining zero percent risk weight. Compute the CAR of SBSL if it has a capital of Rs.150 crore. Comment on the credit risk position of the company.

Capital Adequacy =
$$\frac{\text{Capital}}{\text{Risk Weight of Assets}}$$

= $\frac{150}{(600 \times 0.1 + 300 \times 0.5 + 100 \times 0)} = 20\%.$

The CAR of SBSL is relatively high when compared to the minimum CAR of 8 percent and suggests that the bank is in a better position regarding its credit exposure. The bank can continue its credit policy and maintain the high level of CAR. Alternatively, the bank can adopt a more aggressive risk profile towards credit in view of the high level of CAR. This depends on the profit planning and risk aversion of the bank.

Illustration 2

A bank has a capital base of Rs.150 crore and its total assets are worth Rs.2,200 crore. While Rs.200 crore worth assets are risk free, the risk weights for the remaining assets are given below. Compute the total Risk Weighted Assets (RWAs), the Average Risk Weight (ARW) and the Capital Adequacy Ratio (CAR) for the various combinations. Based on the result obtained, identify the combination of assets which give the minimum/maximum credit risk exposures to the bank.

	Assets	Risk wts
1.	800	50%
	1200	25%
2.	1000	50%
	1000	25%
3.	800	75%
	1200	50%
4.	1000	75%
	1000	50%
5.	1200	75%
	800	50%
6.	800	105%
	1200	50%
7.	1000	100%
	1000	50%
8.	1000	100%
	1000	75%
9.	1200	100%
	800	75%
10.	1700	100%
	300	50%
11.	1500	100%
	500	75%
12.	1800	100%
	200	75%

Solution

The RWAs, ARW and the CAR of the bank can be computed using the following:

RWAs = Assets x Risk Weights

ARW = Total RWAs/Total Assets

CAR = C/Total RWAs

Total Assets= Rs.2,200 croreCapital= Rs.150 crore.

					· · · · · · · · · · · · · · · · · · ·
	Risky Assets	Risk wts	RWAs	ARW	CAR
1.	800	50%	400	0.32	0.214
	1,200	25%	300		
	2,000		700		
2.	1,000	50%	500	0.34	0.200
	1,000	25%	250		
	2,000		750		
3.	800	75%	600	0.55	0.125
	1,200	50%	600		
	2,000		1,200		
4.	1,000	75%	750	0.57	0.120
	1,000	50%	500		
	2,000		1,250		
5.	1,200	75%	900	0.59	0.115
	800	50%	400		
	2,000		1,300		
6.	800	100%	800	0.64	0.107
	1,200	50%	600		
	2,000		1,400		
7.	1,000	100%	1,000	0.68	0.100
	1,000	50%	500		
	2,000		1,500		
8.	1,000	100%	1,000	0.80	0.086
	1,000	75%	750		
	2,000		1,750		
9.	1,200	100%	1,200	0.82	0.083
	800	75%	600		
	2,000		1,800		
10.	1,700	100%	1,700	0.84	0.081
	300	50%	150		
	2,000		1,850		
11.	1,500	100%	1,500	0.85	0.080
	500	75%	375		
	2,000		1,875		
12.	1,800	100%	1,800	0.89	0.077
	200	75%	150		
	2,000		1,950		

Managing Credit Risk

From the values obtained above it can be observed that when the RWAs stand at Rs.700 crore, the bank will be having the maximum CAR. At this level, the credit exposure of the bank will be the minimum. On the other hand, the maximum credit exposure for the bank will be at the level where the RWAs are Rs.1,950 crore. This combination of assets and their risk weights give the minimum CAR of 7.7 percent. This infact falls below the minimum statutory requirement for CAR. The bank should ensure that its portfolio should not comprise of such level of ARW.

To draw more conclusive implications on the interlinkage that exists between the CAR, RWAs and the credit risk, consider the graphical representation of the above illustration as shown in Graph 1.



Graph 1: Credit Exposure Chart

From the graph it can be observed that as the ARW of the asset portfolio is rising, there is a decline in the CAR. The graph also presents the minimum statutory level of CAR (MCAR) at 8 percent and compares it to the Bank's CAR levels. As long as the CAR is above this level the credit exposure is expected to remain within controllable limits and the greater the CAR the higher the safety for the firm. The shaded portion gives the safety level when the CAR is above the minimum statutory level.

It can thus be adduced that when the bank monitors its credit exposure using the CAR approach, it can maintain the credit risk within the controllable limits by adjusting the average risk weighted assets.

The main aim of the credit policy of a bank will be to screen out the best proposals for acceptance. The CAR discussed above provides a benchmark for monitoring the risk level considering the total assets of the company. Unlike the ENPA model, the CAR approach does not make any distinction between a performing asset and a non-performing asset both of which may have the same risk weight.

Establishing Suitable Risk Position: Since banks cannot delink the credit risk from the lending activity, they can only attempt to reduce it to some extent by spreading their loans over a large group of borrowers, selling their services in a variety of markets with different economic characteristics.

Banks can diversify their credit risk by maintaining proper exposure limits for its credit sanctions. Diversification can be attained by setting exposure limits in the following areas:

- Types of individuals, company/group of companies and industry;
- Categories of loan (product-type term loan/CC etc.);
- Geographical concentration.

Though exposure norms are prescribed by the central banks to prevent banks from taking unlimited exposures, it will be in the interest of the banks to develop a policy framework for determining such exposure limits depending on its risk policy.

Box 2: Management Information Systems – Management of Credit Risk
Banks must have information systems and analytical techniques that enable management to measure the credit risk inherent in all on- and off-balance sheet activities. The management information system should provide adequate information on the composition of the credit portfolio, including identification of any concentrations of risk.
Banks should have methodologies that enable them to quantify the risk involved in exposures to individual borrowers. Banks should also be able to analyze credit risk at the product and portfolio level in order to identify any particular sensitivities or concentrations. The measurement of credit risk should take account of:
i. The specific nature of the credit (loan, derivative, facility, etc.) and its contractual and financial conditions;
ii. The exposure profile until maturity in relation to potential market movements;
iii. The existence of collateral or guarantees; and
iv. The potential for default based on the internal risk rating. The analysis of credit risk data should be undertaken at an appropriate frequency with the results reviewed against relevant limits. Banks should use measurement techniques that are appropriate to the complexity and level of the risks involved in their activities, based on robust data, and subject to periodic validation.

The effectiveness of a bank's credit risk measurement process is highly dependent on the quality of management information systems. The information generated from such systems enables the board and all levels of management to fulfill their respective oversight roles, including determining the adequate level of capital that the bank should be holding. Therefore, the quality, detail and timeliness of information are critical. In particular, information on the composition and quality of the various portfolios, including on a consolidated bank basis, should permit management to assess quickly and accurately the level of credit risk that the bank has incurred through its various activities and determine whether the bank's performance is meeting the credit risk strategy.

Banks should monitor actual exposures against established limits. It is important that banks have a management information system in place to ensure that exposures approaching risk limits are brought to the attention of senior management. All exposures should be included in a risk limit measurement system. The bank's information system should be able to aggregate credit exposures to individual borrowers and report on exceptions to credit risk limits on a meaningful and timely basis.

Banks should have information systems in place that enable management to identify any concentrations of risk within the credit portfolio. The adequacy of scope of information should be reviewed on a periodic basis by business line managers and senior management to ensure that it is sufficient to the complexity of the business. Increasingly, banks are also designing information systems that permit additional analysis of the credit portfolio, including stress testing.

Source: Bureau of International Standards. www.BIS.org.

CONTINGENT RISK

Yet another risk, to which banks are exposed to, is the contingent risk which arises due to the presence of various contingent liabilities in the bank's balance sheet.

Contingent liability arises when a bank does not grant a loan, but promises to undertake a liability on behalf of its client, consequent to happening or non-happening of an event. With this promise, its obligation to provide funds to a third party is contingent. Such a liability does not appear on the balance sheet until the contingency is realized. Contingent liabilities, therefore, are referred to as offbalance sheet items. These off-balance sheet items can be classified into the following heads:

Commitments: The bank has committed itself to advance funds and in the process acquires a credit exposure at some future date. These commitments include:

- Unused overdrafts and credit lines,
- Revolving lines of credit,
- Note issuance facilities (NIFs),
- Repurchase agreements (repos).

Guarantees: In this case, the bank underwrites an obligation to a third party and extends guarantee for payment in case its client defaults. Though the bank currently stands behind the risk, any default by its client will trigger a loss or result in it acquiring a sub-standard asset. Examples of this type of contingent liabilities are:

- Asset sales with recourse,
- Deferred payment guarantees,
- Financial guarantees,
- Performance guarantees,
- Commercial letters of credit.

Foreign Exchange/Interest Rate Related Transactions: These items relate to the interest rate and foreign exchange rate agreements that are binding on the client company. Since it is a binding agreement, in cases where the client company is unable to exercise its obligation, the bank carries out its side of the contract. Examples of this type of exposures include mostly the hedging instruments. Such hedging instruments are not yet seen in the Indian market except for forward contracts.

Other Activities: When the bank is into investment banking and merchant banking operations, it also generally performs the activity of underwriting securities. Here the bank offers to subscribe to the unsubscribed part of a securities issue.

Contingent liabilities, no doubt, do bring in valuable income for the bank apart from nurturing its relationship with customers. Nevertheless, there is also the possibility of the bank overexposing itself to the various risks. Due to the nature of these commitments, the off-balance sheet items may become on-balance sheet when the contingency is realized. For example, when the cash credit holder draws upon the account, the cash reserves decline and also the unused cash credit limit will come down. Similar is the case when a guarantee is invoked due to default by the customer. Here the cash reserves decline while the loan to the customer increases.

Apart from making a note of the shifts in the balance sheet items, what is more important for the bank is to keep track of the changing dimensions of its risk profile. Consider the above mentioned contingent items. In the case of the cash credit limit, there is a possibility of liquidity risk, the magnitude of which relates to the contingency realized. The magnitude of such liquidity risk is large as the bank cannot know in advance when its obligations will crystallize and is unable to plan for it. This becomes significant when such unutilized limits are considered for the bank as a whole. Similarly, in the case of a guarantee, the contingency arises due to insolvency of the customer, the balance sheet of the bank will be reflecting a loan which may in fact be worthless. In addition to these, underwriting commitments and loan commitments can expose the bank to interest rate risk also.

In the above mentioned cases, the contingency risk arises only if the contingency commitment crystallizes. Hence the basic risk involved in such commitment relates to the creditworthiness of the client company. There is a possibility of credit risk because the credit standing of the borrower may deteriorate during the term of the commitment.

Thus, it is clear that the bank by exposing itself to contingent risk is also indirectly enhancing its exposure to a host of other risks. Even though the bank charges a penal interest on crystallized liabilities, sometimes this may actually not be sufficient to cover the losses incurred in the transaction.

Due to the presence of various other risks, there cannot be a single method to measure the contingent risk. When it enters into such commitments the bank should forecast its impact on the various risks. This will enable it to take immediate corrective action when the contingent liability crystallizes. Thus, the best measure to tackle contingent risk is to assign risk weights to all the contingent liabilities and consider them as a part of the bank's risk weighted portfolio. Hence all the contingent items are given risk weights ranging from 2 percent to 100 percent so as to capture their impact on the risk profile of the bank. It is, in fact, desirable to consider assignment of higher risk weights than the prescribed risk weights depending on the past experience of individual banks.

Generally, the non-fund based activities of a bank generate off-balance sheet items and if these form a major part of its operations, then the need to manage the contingent risk will be of paramount importance.

Just as a thorough appraisal is done before granting a loan, the bank will also have to ensure a proper appraisal before extending any guarantee or accepting any contingent liability. As mentioned earlier, when the contingent liability is realized first, the liquidity of the bank is affected leading to liquidity risk. Since the bank will now make payments on behalf of the client it means that there is a credit facility offered to the client leading to credit risk. And considering the credit risk, the bank will have to charge an appropriate premium to minimize its interest rate risk.

CREDIT RISK MODELS

Success comes out of measuring because what cannot be measured cannot be managed.

It has been observed that over the past few years, a remarkable change has come in the way credit risk is being measured. In contrast to the accounting-driven concept that is relatively dull, and routine in nature, new technologies and methodologies have emerged among a new generation of financial engineering professionals who are now applying their engineering skills and analysis in this area.

The primary reasons for this change are:

- Matured market for market risk gaining importance: Given the maturity of market risk models, and the experience gained over the past decades, the market risk area has evolved in a way that frees resources and welcomes new challenges, such as credit and operational risk.
- **Disintermediation of borrowers:** With the capital markets expanding and becoming accessible to small-and middle-market firms, borrowers are more or less left behind to raise funds from banks and other traditional financial institutions that are more likely to be smaller and have weaker credit ratings. Capital market growth has impacted on the credit portfolio structure of traditional financial institutions.
- **Competitive margin structure:** Although there is a decline in the average quality of loans that has resulted due to the disintermediation process, the respective margin spreads, have lessened, or in other words the risk premium

trade-off from lending turned worse. There can be a number of reasons for this; one of the important factors is the enhanced competition for lowerquality borrowers.

- **Change in bankruptcies:** In spite of the fact that the most recent recessions hit at different times in different countries, bankruptcy statistics have been on the high, compared to the prior economic downsides.
- **Diminishing and volatile values of collaterals:** Coupled with the ongoing Asian crisis, banking crises in well-developed countries have shown that real estate values and precise asset values are very hard to predict and realize through liquidation. The weaker the rating and the more uncertain collateral values are, the more risky lending is likely to be.
- **Off-balance-sheet derivatives exposures:** The growth of credit exposure and counterparty risk has extended the need for credit analysis beyond the loan book. In many of the largest banks, the notional value of the off-balance-sheet exposure to instruments such as over-the-counter (OTC) swaps and forwards exceeds more than 10 times the size of the loan portfolios.
- **Capital requirements:** Under the BIS system, banks are supposed to hold a capital requirement based on the marked-to-market current value of each OTC derivatives contract (so-called current exposure) plus an add-on for potential future exposure.
- **Technological advances:** Computer infrastructure developments and related advances in information technology such as the development of historic information databases have given banks and financial organizations the opportunity to test high-powered modeling techniques. In the case of credit risk management, besides being able to analyze loan loss and value distribution functions and especially the tails distributions, the infrastructure enables the active management of loan portfolios, based on modern portfolio theory (MPT) models and techniques.

BIS RISK-BASED CAPITAL REQUIREMENT FRAMEWORK

The current BIS regime has been described as a "one size fits all" policy; virtually all loans to private-sector counterparties are subjected to the same 8 percent capital ratio (or capital reserve requirement), not taking into account the different impacts of the size of the loan; the maturity of the loan; or most important, the credit quality (rating) of the borrowing counterparty. Under current capital requirement terms, loans to a firm near bankruptcy are treated in the same fashion as loans to a AAA borrower or the government. Further, the current capital requirement is additive across all loans; there is no allowance for lower capital requirements because of a greater degree of diversification in the loan portfolio.

In 1997, the European Community was the first to give certain large banks the discretion to calculate capital requirements for their trading books – or market risk exposures – using internal models rather than the alternative regulatory (standardized) model. Internal models are subject to certain constraints imposed by regulators and are subjected to backtesting verification. They potentially allow the following revisions:

- VaR of each tradable instrument to be more accurately measured (for example, based on its price volatility, maturity, etc.).
- Correlations among assets (diversification effect) to be taken into account.
- The current regulative framework is additive and does not consider diversification in the loan portfolio to allow lower capital requirements.

Box 3: Beyond Basel-I

Since exposure to credit risk continues to be the leading source of problems in banks worldwide, banks and their supervisors should be able to draw useful lessons from past experiences. Banks should now have a keen awareness of the need to identify, measure, monitor and control credit risk. They also determine whether they hold adequate capital against these risks and whether they are adequately compensated for risks incurred. Therefore, the banking supervisors worldwide should promote sound practices to manage credit risk. The Bank for International Settlements has set out sound practices that address the following areas:

- i. Establishing an appropriate credit risk environment;
- ii. Operating under a sound credit granting process;
- iii. Maintaining an appropriate credit administration, measurement and monitoring process; and
- iv. Ensuring adequate controls over credit risk.

Although specific credit risk management practices may differ among banks depending upon the nature and complexity of their credit activities, a comprehensive credit risk management program will address these four areas. These practices should also be applied in conjunction with sound practices related to the assessment of asset quality, the adequacy of provisions and reserves, and the disclosure of credit risk.

The Proposed Basel Capital Accord

The Basel New Accord is more extensive and complex than the 1988 Accord. The New Accord is more risk sensitive and it contains a range of new options for measuring both credit and operational risks, which would be implemented in member countries in 2006. The adoption of the New Capital Adequacy Framework, relating to assigning capital on a consolidated basis, use of external credit assessments as a means for assigning preferential risk weights, sophisticated techniques for estimating economic capital, etc., may need suitable modifications to adequately reflect the institutional realities and macroeconomic factors specific to emerging market economies including India. In this scenario, it is imperative that the Indian banks identify their transition path and initiate steps to be fully prepared for the adoption of the new standards when introduced.

Internal models require additional enhancements before they can replace the 8 percent rule, especially because of the non tradability of some types of loans compared to marketable instruments, and the lack of deep historic databases on loan defaults. However, the new internal models offer added value to financial organizations, regulators, and risk managers. Specifically, internal model approaches potentially offer better insight on how to value and manage outstanding loans and credit risk-exposed instruments such as bonds (corporate and emerging market), as well as better methods for estimating default risk probabilities regarding borrowers and derivative counterparties. Moreover, internal models have the following advantages:

- In many cases they allow a better estimation of the credit risk of portfolios of loans and credit risk-sensitive instruments.
- They enhance the pricing of new loans, in the context of a bank's Risk Adjusted Return On Capital (RAROC), and of relatively new instruments in the credit derivatives markets (such as credit options, credit swaps, and credit forwards). The models provide an alternative opportunity to measure the optimal or economic amount of capital a bank should hold as part of its capital structure.
Box 4: The Basle II proposals for Credit Risk

The new framework provides a menu of approaches in respect of credit risk as:

- i. Standardized Method
- ii. Internal Rating Based (IRB) approach Foundation
- iii. Internal Rating Based (IRB) approach Advanced.

Standardized Method

Under this approach preferential risk weights, in the range of 0%, 20%, 50%, 100% and 150% are assigned for different categories of assets on the basis of external ratings by approved rating agencies. Thus for corporate accounts under the Current Accord there is only one risk weight of 100% but the new framework provides for 4 categories i.e., 20%, 50, 100% and 150% depending on the rating status of the corporate. Claims past due over 90 days require a risk weight of 150%. The approach is conceptually the same as the current approach. The basic difference is that the categorization would depend on a rating done by an external rating agency.

IRB (Internal Rating Based) Approach

Under this approach, banks, which comply with certain requirements, would be allowed to internally assess and derive the risk weights, which are then used to compute capital requirements. The risk weights are derived as a continuous function of PD, LGD&EAD, where PD is the Probability of Default associated with each rating grade, LGD is the Loss Given Default in each facility type, i.e., the unrealized portion and EAD, the Exposure At Default. The migrations in ratings in different rating grades are tracked over a period of 5 to 7 years to arrive at a representative PD. In the foundation approach, the banks are allowed to estimate the PD while the supervisor will provide LGD and EAD. In the advanced approach, banks would use their own estimates of PD, LGD, and EAD. The IRB approach thus does not rely on supervisory determined risk buckets as in the case of the standardized approach.

The Committee estimates that there would be a reduction of around 2 to 3 of risk weighted assets in the foundation approach as compared to the standardized approach and the capital requirement under the advanced approach would be around 90% of the requirement under the foundation approach. A more sophisticated approach would mean a finer measurement of risk and hence a lesser regulatory requirement.

Source: South Indian Bank.

TRADITIONAL CREDIT RISK MEASUREMENT APPROACHES

It is hard to draw a clear line between traditional and new approaches, as many of the superior concepts of the traditional models are used in the new models. For the purposes of this historical review, the traditional credit models are segregated into three types: expert systems, rating systems, and credit-scoring systems.

Expert Systems

In an expert system, the credit decision is made by the local or branch credit officer. Implicitly, this person's expertise, skill set, subjective judgment, and weighting of certain key factors are the most important determinants in the decision to grant credit. The potential factors and expert systems a credit officer could look at are infinite. However, one of the most common expert systems, the "five Cs" of credit, will yield sufficient understanding. The expert analyzes these five key factors, subjectively weights them, and reaches a credit decision:

• **Capital Structure:** The equity-to-debt ratio (leverage) is viewed as a good predictor of bankruptcy probability. High leverage suggests greater probability of bankruptcy than low leverage, as a low level of equity reduces the ability of the business to survive losses of income.

- **Capacity:** The ability to repay debts reflects the volatility of the borrower's earnings. If repayments on debt contracts prove to be a constant stream over time, but earnings are volatile (and thus have a high standard deviation), its highly probable that the firm's capacity to repay debt claims would be at risk.
- **Collateral:** In the event of a default, a lender has a claim on the collateral pledged by the borrower. The greater the proportion of this claim and the greater the market value of the underlying collateral, the lower the remaining exposure risk of the loan in the case of a default.
- Cycle/Economic Conditions: An important factor in determining credit risk exposure is the state of the business cycle, especially for cycle-dependent industries. For example, the infrastructure sectors (such as the metal industries, construction, etc.) tend to be more cycle dependent than nondurable goods sectors, such as food, retail, and services. Similarly, industries that have exposure to international competitive conditions tend to be cycle sensitive. Taylor, in an analysis of Dun and Bradstreet bankruptcy data by industry (both means and standard deviations), found some quite dramatic differences in US industry failure rates during the business cycle.
- **Character:** This is a measure of the firm's reputation, its willingness to repay, and its credit history. In particular, it has been established empirically that the age factor of an organization is a good proxy for its repayment reputation.

Another factor, not covered by the five Cs, is the interest rate. It is well known from economic theory that the relationship between the interest-rate level and the expected return on a loan (loss probability) is highly nonlinear. At low interest-rate levels, the expected return could increase if rates are raised. However, at high interest-rate levels, an increase in rates may lower the return on a loan, as the probability of loss would increased.

This negative relationship between high loan rates and expected loan returns is due to two effects:

- i. Adverse selection, and
- ii. Risk shifting.

When loan rates rise beyond some point, good borrowers drop out of the loan market, preferring to self-finance their investment projects or to seek equity capital funding (*adverse selection*). The remaining borrowers, who have limited liability and limited equity at stake – and thus lower ratings – have the incentive to shift into riskier projects (*risk shifting*). In upside economies and supporting conditions, they will be able to repay their debts to the bank. If economic conditions weaken, they will have limited downside loss from a borrower's perspective.

Although many financial institutions still use expert systems as part of their credit decision process, these systems face two main problems regarding the decision process:

- **Consistency:** What are the important common factors to analyze across different types of groups of borrowers?
- **Subjectivity:** What are the optimal weights to apply to the factors chosen?

In principle, the subjective weights applied to the five Cs derived by an expert can vary from borrower to borrower. This makes comparability of rankings and decisions across the loan portfolio very difficult for an individual attempting to monitor a personal decision and for other experts in general. As a result, quite different processes and standards can be applied within a financial organization to similar types of borrowers. It can be argued that the supervising committees or multilayered signature authorities are key mechanisms in avoiding consistency problems and subjectivity, but it is unclear how effectively they impose common standards in practice.

Rating System

One of the oldest rating systems for loans was developed by the US Office of the Comptroller of the Currency (OCC). The system has been used in the United States by regulators and bankers to assess the adequacy of their loan loss reserves. The OCC rating system allocates an existing loan into five rating buckets: four low-quality ratings and one high-quality rating. In Table 3, the required loss reserve appears next to each category.

Over the years, the financial institutions have extended and enhanced the OCCbased rating system by developing internal rating systems that more finely subdivide the pass/performing rating category.

The OCC pass grade is divided into six different categories (ratings 1 to 6). Ratings 7 to 10 correspond to the OCC's four low-quality loan ratings. These loan-rating systems do not exactly correspond with the bond-rating systems, especially at the lower-quality end of the spectrum. One reason is the different focus of the approaches: loan-rating systems are supposed to rate an individual loan (including its covenants and collateral backing). Bond-rating systems are more oriented toward rating the overall borrower. This gap of one-to-one mapping between bond and loan rating methodologies raises a flag as to the merits of those newer approaches that rely on bond data (spreads, transition matrices, etc.) to value and price loans individually and in a portfolio context.

Rating Bucket	Loss Reserves, %
Low-quality ratings	
Other Assets Especially Mentioned (OAEM)	0
Substandard assets	20
Doubtful assets	50
Loss assets	100
High-quality rating	
Pass/performing	0
Note: From a technical perspective, the 0 percent loss reserves for OAEM and	
pass loans are lower bounds. In practice, the reserve	rates on these categories are

Table 3: The Example for Loss Reserves Based on the Rating System

Source: U.S. Office of the Comptroller of the Currency, EC-159 (rev.), December 10, 1979, www.ccc.Treas gov/ftp/release.

determined by the bank in consultation with examiners and auditors, depending

on some type of historical analysis of charge-off rates for the bank.

Given this trend toward finer internal ratings of loans, compared to the OCC's regulatory model, the 1998 Federal Reserve System Task Force Report offer some tentative support to the use of an internal model ratings-based approach as an alternative to the OCC model, to calculate capital reserves against unexpected losses, and loan loss reserves against expected loan losses. For example, using the outstanding dollar value of loans in each internal rating class (1 to 10), a bank might calculate its capital requirement against unexpected loan losses as follows:

Capital requirement = $\Sigma \begin{bmatrix} \text{Total class 1 loans 0.02\%} \\ + \\ \vdots \\ + \\ \text{Total class 10 loans 0.100\%} \end{bmatrix}$...(4)

The 0.2 percent for rating class 1 is just suggestive of unexpected loss rates and should be based on historic loss probabilities of a loan in class 1 moving to class 10 (loss) over the next year. However, an important problem remains, similar to the current 8 percent risk-based capital ratio of the BIS approach – the diversification in the loan portfolio is not considered.

The credit risks of each rating class are simply added up to calculate a total capital requirement.

Credit-Scoring Systems

Credit-scoring approaches can be found in virtually all types of credit analysis. The basic concept is generally the same: certain key factors are analysed. They determine the loss probability of default and the recovery rate (as opposed to repayment), and they are combined or weighted into a quantitative score schema. The score can be literally interpreted as a loss probability of default. In other scoring systems, the score can be regarded as a classification system: it allocates a potential or existing borrower into either a good group (higher rating) or a bad group (lower rating), based on a score and a cutoff point. Full reviews of the traditional approach to credit scoring, and the various methodologies, can be found in Caouette, Altman, and Narayanan and in Saunders. The Altman Z-score model is a classification model for corporate borrowers and can also be used to get a default probability prediction. Based on a matched sample by year, size, and sectors of defaulted and solvent firms, and applying the linear discriminant analysis, the best-fitting scoring model for commercial loans results in the following equation:

$$Z = 1.2 \text{ x } X_1 + 1.4 \text{ x } X_2 + 3.3 \text{ x } X_3 + 0.6 \text{ x } X_4 + 1.0 \text{ x } X_5 \qquad \dots (5)$$

Where,

- $X_1 =$ working capital/total assets ratio,
- $X_2 =$ retained earnings/total assets ratio,
- X_3 = earnings before interest and taxes/total assets ratio,
- X_4 = market value of equity/book value of total liabilities ratio,
- $X_5 = sales/total assets ratio.$

If a corporate borrower's accounting ratios X_i weighted by the estimated coefficients in the Z function, result in a Z score below a critical value, the borrower would be classified as "insufficient" and the loan would be refused.

A number of issues need to be discussed here. First the model is linear, whereas the path to bankruptcy can be assumed to be highly nonlinear, and the relationship between the X_i values itself is likely to be nonlinear. A second issue is that, with the exception of the market value of equity term in the leverage ratio, the model is essentially based on accounting ratios. In most countries, standards require accounting data only at discrete intervals (for example, quarterly) and are generally based on historic or book-value accounting principles. As the world becomes more complex and competitive, and the decision flow becomes faster, the predictability of simple Z-score models may worsen. Brazil offers a good example. When fitted in the mid-1970s, the Z-score model did quite a good job of predicting default even two or three years prior to bankruptcy. However, more recently, even with low inflation and greater economic stability, this type of model has performed less well as the Brazilian economy has become more open.

The recent application of nonlinear methods (such as neural networks) to credit risk analysis shows potential to improve on the proven credit-scoring models. Rather than assuming there is only a linear and direct effect from the X_i variables on the Z credit score (or, in the language of neural networks, from the input layer to the output layer), neural networks allow for additional explanatory power via complex correlations or interactions among the X_i variables (many of which are nonlinear). For example, the five variables in the Altman Z-score model can be described by some nonlinearly transformed sum of X_1 and X_2 as a further explanatory variable.

Managing Credit Risk

In neural network terminology, the complex correlations among the X_i variables form a "hidden layer" which, when exploited (i.e., included in the model), can improve the fit and reduce type 1 and type 2 errors. (A type 1 error consists of misjudging a bad loan as good; a type 2 error consists of misjudging a good loan as bad.)

Yet, neural networks pose many problems for financial economists. How many additional hidden correlations should be included? In the language of neural networks, when should the training stop? It is entirely possible that a large neural network, including large N nonlinear transformations of sums of the X_i variables, can reduce type 1 and type 2 errors of a historic loan database close to zero. However, as is well known, this creates the problem of over fitting — a model that well explains that the in-sample data may perform quite poorly in predicting out-of-sample data. More generally, the issue is when does one stop adding variables – when the remaining forecasting error is reduced to 10 percent, 5 percent, or less? Reality might prove that what is thought to be a global minimum forecast error may turn out to be just a local minimum. In general, the issue of economic meaning is probably the most troubling aspect of financial interpretation and use.

Credit scoring matrices find wide application in the realm of retail credit and SME financing. A detailed discussion on this topic is beyond the scope of this book.

Box 5: Credit Risk Model

Over the last decade, a number of banks worldwide have developed sophisticated systems in an attempt to model the credit risk arising from important aspects of their business lines. Such models are intended to aid banks in quantifying, aggregating and managing risk across geographical and product lines. The outputs of these models also play increasingly important roles in banks' risk management and performance measurement processes, including performance-based compensation, customer profitability analysis, risk-based pricing, active portfolio management and capital structure decisions.

In the measurement of credit risk, models may be classified along three different dimensions: the techniques employed, the domain of applications in the credit process and the products to which they are applied.

The following are the most commonly used techniques for measuring credit risk:

- a. **Econometric techniques** such as linear and multiple discriminant analysis, multiple regression, logic analysis and probability of default, etc.
- b. **Neural networks** are computer-based systems that use the same data employed in the econometric techniques but arrive at the decision model using alternative implementations of a trial and error method.
- c. **Optimization models** are mathematical programming techniques that discover the optimum weights for borrower and loan attributes that minimize lender error and maximize profits.
- d. **Rule-based or expert systems** are characterized by a set of decision rules, a knowledge base consisting of data such as industry financial ratios, and a structured inquiry process to be used by the analyst in obtaining the data on a particular borrower.
- e. **Hybrid Systems** are characterized by simulations driven in part by a direct causal relationship, the parameters of which are determined through estimation techniques.

However, these models are beyond the scope of this chapter and hence not explained in detail.

Domain of application: These models are used in a variety of domains:

- a. **Credit approval:** Models are used on a stand-alone basis or in conjunction with a judgmental override system for approving credit in the consumer lending business. The use of such models has expanded to include small business lending. They are generally not used in approving large corporate loans, but they may be one of the inputs to a decision.
- b. **Credit rating determination:** Quantitative models are used to derive 'shadow bond rating' for un-rated securities and commercial loans. These ratings in turn influence portfolio limits and other lending limits used by the institution. In some instances, the credit rating predicted by the model is used within an institution to challenge the rating assigned by the traditional credit analysis process.
- c. **Credit risk models** may be used to suggest the risk premia that should be charged in view of the probability of loss and the size of the loss. Using a mark-to-market model, an institution may evaluate the costs and benefits of holding a financial asset. Unexpected losses implied by a credit model may be used to set the capital charge in pricing.
- d. **Early warning:** Credit models are used to flag potential problems in the **portfolio** to facilitate early corrective action.
- e. **Common credit language:** Credit models may be used to select assets from a pool to construct a portfolio acceptable to investors at the time of asset securitization or to achieve the minimum credit quality needed to obtain the desired credit rating. Underwriters may use such models for due diligence on the portfolio (such as a collateralized pool of commercial loans).
- f. **Collection strategies:** Credit models may be used in deciding on the best collection or workout strategy to pursue. If, for example, a credit model indicates that a borrower is experiencing short-term liquidity problems rather than a decline in credit fundamentals, then an appropriate workout may be devised.

A brief overview of the four credit risk models that have achieved global acceptance as benchmarks for measuring stand-alone as well as portfolio credit risk is given below.

The four models are:

- i. Altman's Z-score model
- ii. KMV model for measuring default risk
- iii. Credit Metrics
- iv. Credit Risk.

The first two models were developed to measure the default risk associated with an individual borrower. The Z-score model separates the 'bad' firms or the firms in financial distress from the set of 'good' firms who are able to service their debt obligations in time. The KMV model, on the other hand, estimates the default probability of each firm. Thus, the output of this model can be used as an input for risk based pricing mechanism and for allocation of economic capital. The other two models are the most frequently used portfolio risk models in credit risk literature. They are intended to measure the same risks, but impose different restrictions, make different distributional assumptions and use different techniques for calibration.

Source: www.RBI.org.in

The banks may evaluate the utility of these models with suitable modifications to the Indian environment for fine-tuning the credit risk management. The success of credit risk models impinges on the time series data on historical loan loss rates and other model variables, spanning multiple credit cycles. Banks may, therefore, attempt building adequate database for switching over to credit risk modeling after a specified period of time.

Credit risk modeling results in a better internal risk management. Banks' credit exposures typically are spread across geographical locations and product lines. The use of credit risk models offers banks a framework for examining this risk in a timely manner, centralizing data on global exposures and analyzing marginal and absolute contributions to risk. These properties of models may contribute to an improvement in a bank's overall ability to identify, measure and manage risk. Credit risk models may provide estimates of credit risk (such as unexpected loss), which reflect individual portfolio composition; hence, they may provide a better reflection of concentration risk compared to non-portfolio approaches.

Source: www.rbi.org.in

Loan review, administration, and management (LRM) are an inherent process of credit management among banks. The obvious and more serious banking problems arise due to lax credit standards, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that lead to a deterioration in the credit standing of a bank's portfolio. Therefore, the banking industry has been focusing more attention than ever on risk management. At the same time, banking regulators from around the world are working out a complicated set of rules for governing global banks accorded in the Basel II Accord.

Many credit problems reveal basic weaknesses in the credit granting and monitoring processes. While shortcomings in underwriting and management of market-related credit exposures represent important sources of losses at banks, many credit problems would have been avoided or mitigated by a strong internal credit process. Many banks find carrying out a thorough credit assessment (or basic due diligence) a substantial challenge. For traditional bank lending, competitive pressures and the growth of loan syndication techniques create time constraints that interfere with basic due diligence. Globalization of credit markets increases the need for financial information based on sound accounting standards and timely macroeconomic and flow of funds data. When this information is not available or reliable, banks may dispense with financial and economic analysis and support credit decisions with simple indicators of credit quality, especially if they perceive a need to gain a competitive foothold in a rapidly growing foreign market. Finally, banks may need new types of information, such as risk measurements, and more frequent financial information, to assess relatively newer borrowers, such as institutional investors and highly leveraged institutions.

Whilst refocusing of credit practices is essential, certain credit rating models that are being adopted still follow the outdated practices of the past, which focus on risk avoidance, rather than risk management. Avoidance of risk should never be mistaken for risk management and if banks seek to continually avoid risk, significant opportunities will be lost. As a consequence the banks will lose out to more sophisticated competitors. However, banks have now become more sophisticated in their hedging and pricing of interest rate risk. New modeling methods are changing the way banks understand and handle credit risk. One has to wait and watch for the implications.

SUMMARY

- Credit risk is defined as the potential that a bank borrower will fail to meet its obligations in accordance with agreed terms. The goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters.
- Credit rating is the main tool, which helps measure the credit risk and facilitates pricing of the account. It gives vital indications of weaknesses in the account. It also triggers portfolio management at the corporate level.
- Credit risk ratings are designed to reflect the quality of a loan or other credit exposure, and thus explicitly or implicitly the loss characteristics of that loan or exposure.

- Banks have developed sophisticated systems in an attempt to model the credit risk arising from important aspects of their business lines. Such models are intended to aid banks in quantifying, aggregating and managing risk across geographical and product lines. Some of the models include (a) setting of concentration and exposure limits; (b) setting of hold targets on syndicated loans; (c) risk-based pricing; (d) improving the risk/return profiles of the portfolio; (e) evaluation of risk-adjusted performance of business lines or managers using risk-adjusted return on capital ("RAROC"); and (f) economic capital allocation.
- Finally, for efficient credit risk management the acceptable levels of credit risk should be laid. Along with this, a quality index for credit approvals should also be generated, since a sound credit policy will always be a competitive advantage to the company.

Appendix I

Credit Information Bureau

Banks and lending institutions have a traditional resistance, because of the confidential nature of banker-customer relationship, to share credit information on the client, not only with each other, but also across sectors. Specialized institutions known as Credit Information Bureaus (CIB) (also known as credit referencing agencies or credit intelligence firms or credit reporting agencies) have therefore, been set up to function as a repository of credit information – both current and historical data on existing and potential borrowers. These institutions maintain data base of credit information – both positive and negative – on the borrower which can be accessed by the intending lending institution.

The Credit Information Bureau provides a platform for sustainable growth of the Financial Services Sector, helps in Fraud and Loss Prevention and enables the member institutions to achieve higher accuracy in risk prediction. It also facilitates faster decision making in regard to sanction of credit. A credit bureau not only collects but also processes and stores credit information both on the existing borrowers and the potential institutions which are its members. The Bureau does not collect information on deposit accounts current account, chequing account, etc. of the borrower. It collects only credit information from its member banks/institutions. The core functions of the Bureau are –

- to maintain a data bank on borrowers from lending institutions;
- to collect and collate, trade, credit and financial information on borrowers and prospective borrowers of lending institutions;
- to store the information so collected;
- to furnish credit information on request
 - i. in confidence to shareholders of the Bureau;
 - ii. by a shareholder of the Bureau, to a borrower or prospective borrower to whom such information relates subject to such terms and conditions as may be determined by the Bureau, and to prescribe the forms in which such information is to be furnished";

A credit bureau is thus a facilitator for credit dispensation and helps mitigate the credit risk involved in lending. It creates a formal credit referral system, which is highly reliable and at the same time, easily accessible to the eligible user group.

Types of Bureau

There are different types of Credit Information Bureaus.

- 1. Basic Credit Bureaus, collect both 'past due' (negative) and 'non-past-due' (positive) data. They disseminate such information to an authorized party who has requested an "enquiry".
- 2. World Class Bureaus, collect both positive and negative data and also provide a mixture of credit products aimed at minimizing risks/frauds. They have highly sophisticated file selection and merge software. These Bureaus are credit consultants to banks for risk control and prediction scoring, and for developing fraud prevention products.

The Bureau maintains credit information collected from three major sources as under:

- i. Public domain data (Court judgments, records of the Registrar, published information on firms, corporates, etc.).
- ii. Negative listing (where credit grantors list defaulting payers).
- iii. Closed user groups where subscribing credit institutions provide full details of their client's payment profile at periodical intervals (i.e., positive and negative data).

Positive and Negative Data: The sources of data for a Credit Bureau can be classified into financial sector data and external data. Financial sector data includes data called from loan applications, loan performance data and data on external obligations. External data is the information called from public records such as court data, registration data, proprietary information, information on management, ownership/control, corporate structure, trade/market, etc. The information so collected can be either negative or positive. Negative financial data

includes adverse information on the borrower such as delinquencies, defaults, penalties, frauds or bankruptcies. Adverse public record data would find its way to the negative credit file. Positive financial data includes historical record of facilities availed and good and satisfactory performance of loan repayment. Positive data would also include favorable information in the public domain or external data. It is important to note that the information collected from data sources is in the nature of facts and not opinions.

Validations of Information: In order to ensure the accuracy of information collected, the Bureau performs a variety of quality checks on the data. Data collected from the public records are cross-checked for inconsistencies or errors. The tapes containing data received from credit institutions themselves are checked for quality. In case of inconsistency of data, clarification is sought from the source of information itself. The credit information when it is first sought from the source of data integrity tests to seek out errors/inconsistencies checks are done to see that the status codes are applied correctly, names/addresses are accurate and consistent.

A beginning has been made in this direction in our Country. SBI has entered into a MOU with HDFC to set up a credit information bureau. The modalities for setting up of the bureau in regard to ownership and equity participation, management structure, security standards, rights and liabilities of the Bureau, etc., are being worked out. The banks and financial institutions are being encouraged to make the necessary in-house arrangements for collection of such information to the Bureau. The Bureau is expected to expedite credit and investment decisions by banks and financial institutions as also curb the growth of fresh NPAs through better institutional mechanisms.

Appendix II

Credit Derivatives – An Efficient Balance Sheet Management Tool

A number of traditional methods (such as operational limits on credit lines, loan provisioning, portfolio diversification and collateralization) and innovative methods (such as loan securitization and separately capitalized derivatives) are already available internationally to manage credit risk. These are considered to be significantly less flexible on their own that the techniques available in the area of market risk. Capital adequacy guidelines have also encouraged financial institutions to put greater emphasis on the risk and return characteristics of their assets and liabilities. Credit derivatives, make it possible to evaluate and trade credit risk without liquidating the original product. They enhance flexibility and reduce costs. They allow banks to hedge the credit risk of a loan without having to assign the loan and with no risk to deteriorate the relationship. Credit derivatives, therefore, offer banks the advantage of improving the flexibility of their credit structures without imposing constraints on their client relations. This enhances efficient balance sheet management and adds to traditional hedging instruments.

Credit derivatives are a new market segment in the area of financial derivatives. They are financial products which transfer either specific or all the inherent risks of a credit position from one partner in the transaction viz., the risk seller, to another viz., the risk buyer, against payment of a premium. They are a new management tool, which facilitates evaluation and transfer of credit risk. Credit derivatives thus serve to evaluate and separate risks and to make them fungible. The areas of application are the traditional credit and bond business as well as risk and portfolio management. Credit derivatives deal with credit risk or risk of debtor default as pure debtor risk and not general market risk. The hedge refers directly to a particular debtor. The credit risk is typically debtor specific. The focus is placed on individual solutions designed to fulfill customer-specific wishes with an eye on their balance sheets. The products are hardly standardized, and there is practically no secondary market trade, even in the USA. Internationally, capital treatment has yet to be clarified and standardized documentation is not available for most of the products.

Credit derivatives fall into two basic categories – swap-based (i.e., created on the basis fo swap structures) and option-based. The swap-based versions include credit-swaps, basket credit swaps or notes and total return swaps. The option-based versions include spread options and sovereign risk options.

In sum, a bank can reduce credit risk without straining its relationship with a client or losing him altogether. However, in the Indian context, it may be feasible to experiment with credit default swap to begin with. By doing credit swaps, it is possible to take on additional credit lines. Credit swaps make it possible to take over risk without having to grant a loan. Under Indian conditions, credit swaps provide a mechanism for an institution like IDFC to take on the credit risks of banks. The market for credit derivatives is attractive for banks as well as institutional investors. Creditors can eliminate credit risk in part or entirely without documentating this to the market. At the same time, other institutional investors can gain access to credit markets, which would otherwise not be open to them.

Before this, the credit market will get a fillip if existing instructions on banks giving guarantees are reviewed. Scheduled commercial banks cannot currently give guarantees on debt instruments or give a loan/credit facility based on the guarantee of another bank or financial institution. The rationale is that the institution taking the credit risk should also fund the loan. There is an apprehension that the bank giving the loan will rely on the guarantee rather than on the viability of the project. There is need for a rethinking on the issue as a financial guarantee separates the credit risk from funding risk. It enables sound banks particularly international banks operating in India with skills to appraise projects, particularly infrastructure projects, but not in a position to fund these projects due to lack of rupee resources. Banks with resources that do not have the risk appetite for such project can invest in these guaranteed instruments. Financial institutions are giving such guarantees but banks are unable to do so. Banks can be permitted with certain prudential regulations such as treating these guarantees on par with loans for purposes of capital adequacy and exposure norm. Similarly, each bank could lay down a limit on the total amount of such guarantees issued to ensure that it does not over-extend itself.

Source: ICFAI Research Center.

Appendix III

Quantifying Credit Risk Using NPAs

Problem Loans: The most explicit indicator of the quality of loan will be the loan account. Frequent delays and defaults in payment that is reflected in the loan account will be a warning signal for the bank. If the bank does not act promptly for such delays, there may be defaults leading to further degeneration in the quality of the loan and thus create `problem loans'.

Identifying Problem Loans: Identification of problem loans most importantly requires timely access to information and the ability to analyze them. When the bank has the requisite systems in place to provide the loan officers with the necessary information, it not only enables them to trace the early-warning signals of loans but also enables them to take swift measures to prevent the deterioration of the loan quality. This highlights the need for systematic data collection in credit management. Details on the following can provide crucial insights into the post sanction monitoring appraisal system employed by the bank and will enable the bank to identify early warning signals for a problem loan:

- Submission of financial statements Balance Sheet, Profit and Loss and Cash Flow Statements.
- Submission of quarterly/half-yearly statements like CMA
- Submission of periodic stock statements
- Frequency of ad hoc limits to meet the cash commitments
- Reflection of purchase and sales into the account
- Relationship with employees/customers
- Average delay in payment of installments
- Clients projections and performance etc.

While the above mentioned aspects do give adequate information on the performance of the loan account which in turn will help the bank to assess the capability of the borrower to repay, not much inferences can be drawn on the willingness of the borrower to repay. It will always be easier for a bank to take positive measures which may improve the performance of the borrower and in turn their ability to pay. However, not much could be done to influence the willingness of the borrower to pay.

Disparity in knowledge between lenders and borrowers makes the analyses of the borrowers' ability to pay, a difficult task. Borrowers have more information about their financial position than the banks. And it is with this asymmetric information that banks will have to take credit decisions. This situation of asymmetric information which arises due to hidden action and hidden information during the loan processing stage and review stage will lead to problems during loan recovery period. Thus, any concealment of information by the borrower in providing adequate and significant information or any change in the attitude of the borrower can also be considered as a warning signal.

The warning signals do indicate the possibility of a deterioration in the quality of the loan. Getting an indication about the quality of the loan however, does not suffice. This has to be followed by two important actions. Firstly, the bank has to take appropriate and timely steps to upgrade the quality of the loan and secondly, it has to ensure that the quality of the advances is reflected in its financial statements. If the bank does not take into account the quality of the loans while preparing its financial statements, it may be not being showing a true picture of its performance.

Loan Classification: To avoid such a distorted picture, classifying loans into different groups based on their quality has become an international practice. In India, the RBI has issued guidelines on income recognition and asset classification.

Not all problems loans will eventually turn out to become loss assets. Again early detection of problem loans and timely action will be the key steps to prevent any deterioration in the quality of the loans.

Quantifying Credit Risk

Classifying loans into performing and non-performing will enable the banks to determine the amount of provisioning that is to be made. Apart from this, the bank can also quantify its credit risk based on the level of NPAs. The following expression quantifies the credit risk:

$$ENPA = \frac{PBT/TA}{NPAs/TA} \qquad \dots (1)$$

Where,

PBT = Profits before Tax^1

TA = Total Assets.

Thus, credit risk can be quantified in terms of the ratio of the percentage of earnings before tax as a proportion of NPAs (ENPA). Here, PBT is considered since there will be a tax exemption on the loss assets that are to be written-off.

The above equation can be also be expressed as follows:

$$ENPA = \frac{[PAT/(-t)]/TA}{NPAs/TA} \qquad \dots (2)$$

If the ENPA level of a bank is say, 0.50 then one possible interpretation of the value could be that the asset quality is poor. This is due to the fact that if half of the NPAs turn into loss assets, it would lead to a 100 percent write-off on them which clearly will erode the net return on the entire book size. Apart from this, the ratio would also imply that the profitability level is too low.

Illustration 1

Consider the case of ABB Bank Ltd. which has ROA of 1 percent. 12 percent of its book size is non-performing. Compute the ENPA level if its total assets are Rs.150 crore and further comment on the credit risk exposure of the company based on the value obtained. The tax rate applicable is 40 percent.

$$ROA = \frac{PAT}{TA}$$

$$PAT = ROA \times TA$$

$$= 0.01 \times 150 = 1.5.$$

$$ENPA = \frac{PBT/TA}{NPAs}$$

$$= \frac{[PAT/(1-t)]/TA}{NPAs} [Since PAT = PBT(1-t)]$$

$$= \frac{1.5/(0.6 \times 150)}{0.12} = 0.1388.$$

The indication which ABB Bank can get from this ratio is that its total returns will be wiped off with a conversion of just 13.88 percent of its NPAs into loss assets.

To verify this concept, consider that the total book size of the ABB Bank is Rs. 150 cr.

PBT	$= 150 \ge 0.01/0.6$	= Rs.2.50 cr.
NPAs	= 150 x 0.12	= Rs.18 cr.
ENPA	= 13.88%	
13.88 percent of NPAs = $Rs.2.50$ cr.		

Thus, when 13.88 percent of the NPAs turn loss assets, the entire profits will be eroded for ABB Bank. This indicates the level of credit risk. Since the level of loss assets is fairly high it implies that the bank will sustain profits as long as it ensures that the conversion of NPAs into loss assets does not cross the 13.88 percent level.

¹ Profits Before Tax= Net Interest Income + (Other Income – Operational Expenses) – Provisions and ContingenciesProfits After Tax = PBT – Provisions for Tax.

From the formula used to measure the credit risk, it is evident that the rate of return and the level of NPAs not only quantify the credit risk but also affect it since the former has a direct relationship with the profits of the company while the latter has an inverse relationship with the credit exposure level of financial institution.

Illustration 2

For the same bank, consider the following alternatives provided for the NPAs level:

NPAs - 8%, 10%, 12%, 15%, 25%, 50%, 75%, 100%

At these levels of NPAs, the ENPA for the ABB Bank will be as follows:



Graph 1

Now, let us consider the credit risk of the bank for varying levels of profitability. The ENPA of the ABB Bank for the various levels of ROA will be as follows:



Graph 2

The graphical representation of the data given in the above two tables will give the margin of safety for the bank at varying levels of NPAs/ ROA. Graph 2 which links the NPAs to the ENPA level, is a downward slope indicating that as the NPAs increase, the ENPA level falls. This implies that the margin of safety, which is represented by the shaded region in the graph keeps decreasing as the level of NPAs rises.

Graph 2 establishes the relationship between the ROA and the ENPA of the bank. The curve is upward sloping since the ENPA increases with the increase in ROA and so does the margin of safety which is represented by the shaded portion.

It is now understood that the higher ENPA level the better it would be for the financial institution as it indicates lower credit risk. And for the financial institution to achieve higher level of ENPA, it will have to increase its profitability and reduce its NPAs level. In fact by assessing the ENPA for each product or region, greater insights can be obtained on the credit exposure level of the company. Monitoring this ratio over a period of time can enable it to identify any trends.

However, despite continuous monitoring, banks usually do end up with a few of its credit assets turning into problem loans. In such circumstances, the two alternatives available for the bank are to provide for such NPAs or write them off. Considering these two alternatives, it is always better for the financial institution to write-off those NPAs where the probability of repayments is very low. The benefit in choosing this option arises from the tax shield that is available for the loss assets that are written-off.

Illustration 3

KSS Banking Services has a total assets of Rs.8, 000 crore of which the risk weighted assets constitute Rs.6, 000 crore If the NPAs of the company are Rs.200 crore, the profits before provisioning are Rs.180 crore. and the tax rate applicable is 40 percent then compute the profits after tax (PAT) in the following two cases and comment on the same:

Option I : The bank provides for Rs.50 crore

Option II : Provisioning is done for Rs.40 crore and Rs.10 crore are written-off.

Solution

Option I	Rs. in crore
Profits before provisioning	180
Provisions for NPAs	50
Profits Before Tax (PBT)	130

The taxable profits for KSS will be the sum of PBT and the provision made for NPAs since it is not a tax deductible item. Thus the taxable profits are Rs.180 crore resulting in a tax of Rs.72 crore.

	Rs. in crore
PBT	130
Tax	72
Profits After Tax	58

Option II	Rs. in crore
Profits before provisioning	180
Provisions for NPAs	40
Write-off	10
Profits Before Tax (PBT)	130

In this case, provisioning is made for Rs.40 crore only while the remaining Rs.10 crore is written off. And since write offs are tax deductible the taxable profits will be Rs.170 crore (i.e. PBT + provisions). The tax on this will be Rs.68 crore.

	Rs. in crore
РВТ	130
Tax	68
Profits After Tax	62

Thus, it can be observed that the bank shows greater profits when it writes off the loss assets rather than providing for them. The capital of the bank in the second case will also expand since the retained earnings are greater in this case. However, it must be noted that the benefits actually depend upon the prevailing tax laws.

<u>Chapter III</u> Managing Market Risk in Banks

After reading this chapter, you will be conversant with:

- Risk and Sources of Risk
- Measuring Risk and Value-at-Risk (VaR)
- Approach to VaR
- Basel Committee Recommendations
- Types of Risk
- Indian Scenario

The two major sources of risk for banks are – credit risk (the risk that loans will not be repaid) and market risk (the risk of losses arising from adverse movements in market prices). Among these two sources of risk, management of market risk has received increasing attention from managers and supervisors in recent years. This is mainly because of the fact that a bank's financial trading activities have grown manifold.

The BIS defines market risk as, "The risk that the value of on-or off-balance-sheet positions will be adversely affected by movements in equity and interest rate markets, currency exchange rates and commodity prices." Thus, Market Risk is the risk to the bank's earnings and capital due to any changes in the market level variables like interest rates or the prices of foreign exchange or other financial products.

Non-traded Interest Rate Risk

Another large source of market risk for banks is from non-traded interest rate risk. This source of risk is a direct consequence of banks' role as intermediaries. Banks carry a wide mix of both fixed-rate and floating-rate assets and liabilities on their books, many of which are subject to repricing when interest rates change. For example, a balance-sheet structure with predominantly short-term liabilities and long-term fixed-rate assets would be subject to losses when interest rates rise; a balance sheet with the reverse configuration would incur losses when rates fall. The asset and liability management process which takes place within banks is, in part, about the determination of the interest rate sensitivity of the balance sheet and the implementation of risk management practices to hedge the potential effects of interest-rate changes. This is separate from the analysis of any credit risk on the balance sheet (the risk that counterparties may default). The increasing complexity of bank products and the degree of optionality introduced into the retail and wholesale products has heightened the complexity of risk measurement. For these reasons, and given the potential size of these balance-sheet risks, banks have begun to devote significant resources to this area.

Market Risk Management Structure within the Bank

Financial deregulation and the growing sophistication of financial engineering renders financial institutions subject to an increasingly diverse range of complex risks. As a result, risk management is becoming increasingly important, and Banks therefore have to work to strengthen and expand their risk management systems to ensure a sound financial base and stable profits.

A bank's management is required to clearly articulate its market risk policies, its procedures and its prudential risk limits. It is further required to review the working mechanisms and reporting and auditing systems within the banks. The policies should address the bank's exposure on a consolidated basis and clearly define the risk measurement systems that capture all material sources of market risk and analyze their impacts on the bank. The operating prudential limits and the accountability of the line management should also be clearly defined. The Asset-Liability Management Committee (ALCO) should function as the top operational unit for managing the balance sheet within the performance/risk parameters laid down by the Board of the bank. A point that is worth mentioning here is that, any successful implementation of risk management process stems from the top management in the bank with the demonstration of its strong commitment to integrate basic operations and strategic decision-making with regard to risk management. In an idealistic situation, the organization set-up for Market Risk Management should comprise the "Board of Directors" at the top level which is assisted by the "Risk Management Committee" and the "Asset-Liability Management Committee" better known as (ALCO).

Responsibilities for Risks

The Board of Directors is generally bestowed with the overall responsibility for managing of risks. It is the responsibility of the Board to decide the risk management policy of the bank and set limits for liquidity, interest rate, foreign exchange and equity price risks. The second layer of the system, that is the Risk Management Committee is supposed to be a Board-level subcommittee including CEO and heads of Credit, Market and Operational Risk Management Committees. It decides the policy and strategy for integrated risk management containing various risk exposures of the bank including the market risk. Apart from this, the other responsibilities of Risk Management Committee, with specific regard to market risk management aspects, include the following:

- Ensuring sound financial models, and also effective systems are used to calculate the market risk.
- Taking care to appoint qualified and competent staff and independent market risk manager.
- Framing policies and guidelines for measuring, managing and reporting market risk.
- Ensuring that market risk management processes (including people, systems, operations, limits and controls) satisfy bank's policy.
- Reviewing and approving market risk limits, including triggers or stop-losses for traded and accrual portfolios.

At the top of the market risk management team is the Asset-Liability Management Committee that has to ensure adherence to the limits set by the Board as well as decide the business strategy of the bank in line with the bank's predetermined budget and risk management objectives. ALCO plays a vital role in:

- Taking important decisions on the transfer pricing policy of the bank.
- Taking decisions relating to the maturity profile and mix of incremental assets and liabilities.
- Pricing of Product for the bank's deposits and advances.
- Taking decisions that relate to the maturity profile and mix of incremental assets and liabilities.
- Reviewing and articulating funding policy.
- Analyzing the bank's environmental structure comprising the economic and political impact on the balance sheet.
- Aligning the interest rate view of the bank and deciding on the future business strategy.

It is to be remembered here that the size (denoting the number of members) of ALCO would depend on the size of the bank concerned, its specific business mix and organizational complexity.

An Introduction to Value-at-Risk

Value-at-Risk (VaR) is a category of risk measures that describe probabilistically the market risk of a trading portfolio. VaR is widely used by banks, securities firms, commodity and energy merchants, and other trading organizations. Such firms could track their portfolios' market risk by using historical volatility as a risk metric, calculate their portfolio's market value. For managing risk, institutions must know about risks while they are being taken. If a trader mishedges a portfolio, his employer needs to find it out before a loss is incurred. VaR gives institutions the ability to do so. Unlike retrospective risk metrics, such as historical volatility, VaR is prospective. It quantifies market risk while it is being taken.

In the 1990s JP Morgan popularized a novel and sophisticated VaR measure. The firm-wide VaR model developed by JP Morgan in the late eighties modeled various risk factors. The trading units were asked to report their positions' deltas with respect to each risk factor. Based on this a combined portfolio value was generated and the standard deviation of the portfolio value was identified. The VaR measure was applied using various VaR metrics. Though the measure proposed by JP Morgan is less sophisticated than the earlier measures, it made its mark by extending its reach to a wider range of end users. Later in the year 1994, JP Morgan introduced a service called RiskMetrics through which it disseminated the estimation mechanism for VaR parameters related to different asset classes.

In the year 1995, the Basel Committee came up with a revised proposal of its 1988 accord and proposed new limits for minimum capital requirements. The revised proposal gave the banks the flexibility to use either the building-block VaR measure of the proprietary VaR measure. According to the new proposal proprietary VaR measure implemented by banks should support a 10-day 99% VaR metric.

Today many corporate entities have identified VaR as an important component in the organization's overall risk management mechanism. The traditional risk measures are based on volatility and have been unsuccessful in identifying the extreme scenarios of loss occurrence. The growing usage of derivatives by institutions and the devastating corporate mishaps occurred in the '90s have given impetus to the extensive acknowledgement of VaR as an efficient risk measurement mechanism. Although, the initial applications of VaR were concentrated on assessing the risks associated with derivatives transactions, the scope of VaR has increased dramatically to include all kinds of financial risks involved in various business transactions. The growing emphasis of VaR has graduated this technique into an enterprise-wide risk measurement mechanism.

Despite the wide acclaim associated with it, VaR was subjected to several criticisms. The critics of VaR opine that VaR can be useful on in normal market conditions and hence fails to account for extreme market events. Also, problems are identified with the estimation of VaR and the misuse of this method by the individuals for their own benefits. These shortcomings of VaR can be effectively addressed by the future research in this arena. A better understanding of the very purpose of VaR and the efficiency of its components will certainly pave the way for the creation of a highly efficient VaR mechanism.

In the 1990s, a concept called Value at Risk (VaR) became popular. It is the latest concept in the field of risk management. Till then, derivative based Delta, Gamma and Vega as well as Interest Rate measures like Gap, Dollar Value on Basis Points and Convexity measures were used. While these measures were quite accurate, they could not sum up different types of risk, did not allow for preventive control measures and could not measure capital or earnings at risk with precision.

Value at Risk is a statistical measure of the maximum potential loss from uncertain events in the normal business over a particular time horizon. It is measured in units of currency through a probability level. It is the loss measurement consistent with a confidence limit such as 99%, on a probability distribution (usually a normal distribution), implying that this is the measurement of a loss which has a chance of only 1% of being exceeded.

In simple words, if a trader mis-hedges a deal, it is a must to know the chances of loss before they occur. VaR is one such technique that allows the management to do so.

Value-at-risk can be defined as the maximum loss a portfolio of securities can face over a specified time period, with a specified level of probability. For example, a VaR of \$1 million for one day at a probability of 5% means that the portfolio of traded securities would expect to lose at least \$1 million in one day with a probability of 5%. Alternatively, there is 95% probability that loss from the portfolio in one day should not exceed \$1 million. From the probability statement we can interpret that 5% indicates that it is expected to occur once in every 20 trading days.

One of the most important aspects of VaR is that – VaR actually assigns a probability to a dollar amount of happening of the loss. This probability and its corresponding loss amount (5% and \$1 million in the above example) are not associated with any particular event, but it could cover any event that could cause such a loss. For example, a VaR that only measures losses due to market risk will not able to capture credit losses. It is important to remember that VaR is not the maximum loss that could occur, but only a loss amount that could expect to exceed only at some percentage of the time. The actual loss that may occur could be much higher than the VaR.

The basic idea behind VaR is to determine the probability distribution of the underlying source of risk and to identify the worst given percentage of outcomes. The figure illustrates the principle behind computing VaR when the distribution of the change in portfolio value is continuous. The normal curve is widely used for computing VaR, though not necessarily appropriate in all the cases. The biggest attraction of normality is that if the portfolio return is normal, the VaR is the multiple of portfolio standard deviation and the normal value of the confidence level.



ESTIMATION OF VALUE-AT-RISK (VAR) – APPROACHES

It is to be always kept in mind that the volatility in financial markets is usually calculated as the standard deviation of the percentage changes in the relevant asset price over a specified asset period. The volatility for calculation of VaR is usually referred to as the standard deviation of the percentage change in the risk factor over the relevant risk horizon. The calculation of the Value-at-Risk can be done in either of the following ways:

- Historical Simulation,
- Monte Carlo Simulation,
- Parametric VaR.

We discuss below each of these methods in brief, keeping in mind that all the approaches call for some common parameters such as the holding period, the confidence interval of the security concerned and the historical time horizon over which the asset prices are observed.

Historical Simulation

Historical Simulation aids in the estimation of VaR by focusing more on the historical aspects of the financial instruments. As a matter of fact, it takes actual historical rates and revalues positions for each change in the market. The Historical Simulation approach calculates the change in the value of a position using the actual historical movements of the underlying asset(s), but starting from the current value of the asset. It does not need a variance/covariance matrix. The

length of the historical period chosen does impact the results because if the period is too short, it may not capture the full variety of events and relationships between the various assets and within each asset class, and if it is too long, it may be too stale to predict the future. The advantage of this method is that it does not require the user to make any explicit assumptions about correlations and the dynamics of the risk factors because the simulation follows every historical move.

Monte Carlo Simulation

Monte Carlo Simulation helps in the estimation of VaR by simulating random scenarios and revaluing positions in the portfolio. This method is particularly appropriate for all types of instruments, linear and non-linear derivative instruments. The Monte Carlo Simulation method calculates the change in the value of a portfolio using a sample of randomly generated price scenarios. Here the user has to make certain assumptions about market structures, correlations between risk factors and the volatility of these factors. He is essentially imposing his views and experience as opposed to the naive approach of the historical simulation method. At the heart of all three methods is the model. The closer the models fit economic reality, the more accurate the estimated VaR numbers and therefore the better they will be at predicting the true VaR of the firm. There is no guarantee that the numbers returned by each VaR method will be anywhere near each other.

Parametric VaR

Parametric VaR involves the estimation of VaR with the help of equations that specify parameters such as volatility, correlation, delta, and gamma. This method usually yields accurate results for traditional assets and linear derivatives, but it gives less accurate results for non-linear derivative products. Under the correlation method, the change in the value of the position is calculated by combining the sensitivity of each component to price changes in the underlying asset(s), with a variance/covariance matrix of the various components' volatilities and correlation. It is a deterministic approach.

Estimating the Volatility

VaR finds its application in the computation of volatility from past data. Different methods are employed to estimate volatility. One may be the arithmetic moving average calculated from the historical time series data. Another may be the exponential moving average method. In the exponential moving average method, the volatility estimates rises faster to shocks and declines gradually. Further, different banks take different number of days of past data to estimate volatility. For all practical purposes it is to be borne in mind that volatility alone does not capture unexpected events, rather it should be used in combination with "stress tests" to take care of event risks. This is mainly because the process of stress test takes into account the worst case scenario.

Regulatory Measures for Market Risks and Value-at-Risk

The 1988 Basel Accord provided the first step towards tighter risk management and enforceable international regulation with similar structural conditions for financial supervision. The Basel Accord set minimum capital requirements that must be met by banks to guard against credit risk. This agreement led to a still-evolving framework to impose capital adequacy requirements to guard against market risks.

Criticisms of the 1998 Accord

The 1988 Basel Accord had several drawbacks, which became obvious with implementation. The main criticisms were the lack of accommodation of the portfolio approach, the lack of netting possibilities, and the way in which market risks were incorporated.

Managing Market Risk in Banks

According to the 1988 Basel accord, assets were recorded at book value. These positions could deviate substantially from their current market values. As a result, the accounting approach created a potential situation in which an apparently healthy balance sheet with acceptable capital (recorded at book value) hid losses in market value. This regulatory approach concerning accounting, created problems for the trading portfolios of banks with substantial positions in derivatives. This specific drawback convinced the Basel Committee to move towards measuring market risk by the Value-at-Risk approach and mark-to-market position booking.

The Birth of the 1996 Amendment on Market Risks

In view of the increasing exposure to market risks in securities and derivatives trading, the Basel Committee created a substantial enhancement of the credit-riskoriented capital adequacy regulations through new measurement rules and capital requirements to support market risks throughout an institution. The discussion paper proposed two alternative methods for risk measurement and capital requirements to support market risks. The standard model approach was to be used by small and midsized banks lacking the complex technological infrastructure and expertise needed to calculate daily market risk exposures. The internal model approach could be used if the local regulator explicitly allowed the bank to use its own technological infrastructure and expertise to calculate daily market risk exposures. Banks would have the opportunity to use both approaches simultaneously during a transition period. After a certain time, banks would be expected to use only one model across the institution.

Originally, the aim had been for a harmonized standard, which should have balanced the terms of competition between the securities dealers and the banks regarding capital requirements. The development of such a regulative framework would have been supported by a joint project between the Basel Committee and the stock exchange supervisory authorities, for whom market risks have always been in the foreground. The discussion with the Technical Committee of the International Organization of Securities Commission (IOSCO) – the international association of supervisory authorities of the securities houses of the Western industrialized nations – failed, because the IOSCO members could not agree on a common approach. Partly responsible for the failure was the fact that IOSCO had no concrete capital adequacy standard. This would have required a substantial reworking of IOSCO's regulations.

The finalized capital adequacy accord was adopted by the committee in December 1995 and published in January 1996. The member countries had time until the end of 1997 to include the modified capital adequacy regulation in their national supervisory regulations.

Changes to the Capital Accord to Incorporate Market Risks

Starting at the end of 1997, or earlier, if their supervisory authority so prescribed, banks were required to measure and apply capital charges to their market risks in addition to their credit risks. Market risk is defined as "the risk of losses in on-and off-balance-sheet positions arising from movements in market prices." The following risks are subject to this requirement:

- Risks pertaining to interest-rate-related instruments and equities in the trading book.
- Foreign exchange risk and commodities risk throughout the bank.
- Scope and coverage of capital charges.

The final version of the amendment to the capital accord to incorporate market risks regulates capital charges for interest-rate-related instruments and equities and applies to the current market value of items in the bank's trading books. *Trading book* meants the bank's proprietary positions in financial instruments (including positions in derivative products and off-balance-sheet instruments) that are intentionally held for short-term resale. The financial instruments may also be

acquired by the bank with the intention of benefiting in the short-term from actual or expected differences between their buying and selling prices, or from other price or interest-rate variations; positions in financial instruments arising from matched principal brokering and market making; or positions taken in order to hedge other elements of the trading book.

Capital charges for foreign exchange risk and for commodities risk apply to the bank's total currency and commodity positions, subject to some discretion to exclude structural foreign exchange positions.

Countable Capital Components

Following is the definition of capital as per BIS Amendment to the Capital Accord to Incorporate Market Risks:

The principal form of eligible capital to cover market risks consists of shareholders' equity and retained earnings (Tier-I capital) and supplementary capital (Tier-II capital) as defined in the 1988 Accord. But banks may also, at the discretion of their national regulatory authority, employ a third tier of capital ("Tier-III"), consisting of short-term subordinated debt as defined below for the sole purpose of meeting a proportion of the capital requirements for market risks, subject to the following conditions.

The definition of eligible regulatory capital remains the same as outlined in the 1988 Accord and clarified in the October 27, 1998, press release on instruments eligible for inclusion in Tier-I capital. The ratio must be no lower than 8 percent of total capital. Tier-II capital continues to be limited to 100 percent of Tier-I capital.

To clarify the impact of the amendment for market risk on the risk steering of the banks, the capital definitions are summarized as follows:

Banks are entitled to use Tier-III capital solely to support market risks as defined in Parts A and B of the amendment. This means that any capital requirement arising in respect of credit and counterparty risk in the terms of the 1988 Accord, including the credit counterparty risk in respect of derivatives in both trading credit counterparty risk in respect of derivatives in both trading and banking books need to be met by the existing definition of capital in the 1988 Accord (i.e., Tiers-I and II).

Tier-III capital is limited to 250 percent of a bank's Tier-I capital that is required to support market risks. This means that a minimum of about 28.5 percent of market risks need to be supported by Tier-I capital, which is not required to support risks in the remainder of the book.

Tier-II elements may be substituted for Tier-III up to the same limit of 250 percent if the overall limits in the 1988 Accord are not breached. That is, eligible Tier-II capital may not exceed total Tier-I capital, and long-term subordinated debt may not exceed 50 percent of Tier-I capital.

In addition, because the committee believes that Tier-III capital is appropriate only to meet market risk, a significant number of member countries are in favor of retaining the principle in the present Accord where Tier-I capital should represent at least half of total eligible capital – that is, the sum total of Tier-II plus Tier-III capital should not exceed total Tier-I. However, the committee has decided that any decision whether to apply such a rule should be a matter for that particular nations discretion. Some member countries may keep the constraint, except in cases in which banking activities are proportionately very small. In addition, national authorities will have discretion to refuse the use of short-term subordinated debt for individual banks or for their banking systems generally. For short-term subordinated debt to be eligible as Tier-III capital, it must, if circumstances demand, be capable of becoming part of a bank's permanent capital and thus be available to absorb losses in the event of insolvency. It must, therefore, at a minimum–

- Be unsecured, subordinated, and fully paid-up.
- Have an original maturity of at least two years.
- Must not be repayable before the agreed repayment date unless the supervisory authority agrees.
- Be subject to a lock-in clause which stipulates that neither interest nor principal may be paid (even at maturity) if such payment means that the bank will fall below or remain below its minimum capital requirement.

The de Minimis Rule

The Basel Committee has ruled out the use of simplifying approaches, allowing small institutions with negligible exposures to be excluded from the capital requirement for market risks.

For the time being, the Committee does not believe that it is necessary to allow any de minimis exemptions from the capital requirements for market risk, except for those for foreign exchange risk, because the Capital Accord applies only to internationally active banks, and then essentially on a consolidated basis to all those who are likely to be involved in trading to some extent.

However, several countries, such as Germany and Switzerland, have included de minimis rules in their national regulations, especially with regard to asset management-oriented institutions which have negligible market risk positions.

Assuming the approval of the national authorities (subject to compliance with the criteria for de minimis exception), local supervisors are free to monitor the relevant exposures in the non-de minimis institutions more carefully. The approach is reasonable for smaller asset management and private banking institutions, which do not take substantial amounts of risk on their own books, as they execute on behalf of their clients. The important distinction is between organizations subject to the standard model approach and those subject to the internal model approach, as this difference determines how risk has to be supported by capital. Thus it fixes capital that could be used for other business purposes.

The Standardized Measurement Method

With the standard approach, a standardized framework for a quantitative measurement of market risks and the capital calculation to support market risks is given for all banks. The capital adequacy requirements are preset, depending on the following risk factor categories:

- Interest-rate and equity-price risks in the trading book.
- Currency, precious metals, and commodity risks in the entire organization.

The capital adequacy requirements are calculated for each individual position and then added to the total capital requirement for the institution; (refer Table 1).

For interest-rate risk, the regulations define a set of maturity bands, within which net positions are identified across all on- and off-balance-sheet items. A duration weight is then assigned to each of the 13 bands, varying from 0.20 percent for positions under 3 months to 12.50 percent for positions over 20 years. The sum of all weight net positions then yield an overall interest-rate-risk indicator. Note that the netting of positions within a band (horizontal) and aggregation across bands (vertical) essentially assume perfect correlation across debt instruments.

Table 1

Capital Adequacy Requirements with the Standardized Measurement Method

Interest-rate-sensitive position	General market risk: duration or maturity method.
*	Specific market risk: Net position by issuer x weight factor, depending on the instrument class.
Equity instruments	General market risk: 8% of the net position per national market. Specific market risk: 8% of the net position per issuer.
Precious metals	10% of the net position.
Currencies	10% of all net long positions or all net short positions, whichever is greater.
Commodities	20% of the net position per commodity group + 3% of the net position of all commodity groups.

For currency and equity risk, the market risk capital charge is essentially 8 percent of the net position; for commodities, the charge is 15 percent. All of these capital charges apply to the trading books of commercial banks, except for currency risks which apply to both trading and banking books.

The framework for measurement of market risks and the capital calculation to support market risks has to ensure that banks and securities dealers have adequate capital to cover potential changes in value (losses) arising due to changes in the market price. Not including derivatives, which usually exhibit nonlinear price behavior, the potential loss based on the linear relationship between the risk factors and the financial instruments corresponds to the product of position amount, sensitivity of the position value regarding the relevant risk factors, and potential changes in the relevant risk factors. Equation (1) provides a methodological basis for the measurement of market risks as well as the calculation of the capital requirements based on the standard approach.

$$\Delta_{\rm w} = {\rm w.s.}\Delta_{\rm f}$$

...(1)

Where,

 $\Delta_{\rm w}$ = change in value of the position,

w = value of the position,

s = sensitivity,

 Δ_{f} = change in the price-relevant factor.

For the quantification of market risks using eq. (1), the direction of the change of the relevant risk factors is less important than the change per se. This is based on the assumption that the long and short positions are influenced by the same risk factors, which cause a loss on the net position. The extent of the potential changes of the relevant risk factors has been defined by BIS such that the computed potential losses, which would have to be supported by capital, cover approximately 99 percent of the value changes that have been observable over the last 5 to 10 years with an investment horizon of 2 weeks.

The framework of the standard approach is based on the building-block concept, which calculates interest rate and equity risks in the trading book and currency, precious metals and commodity risks in the entire institution separate from capital requirements, which are subsequently aggregated by simple addition. The building-block concept is also used within the risk categories. As with equity and interest-rate risks, separate requirements for general and specific market risk components are calculated and aggregated.

From an economic viewpoint, this concept implies that correlations between the movements – the changes in the respective risk factors – are not included in the calculation and aggregation. With movements in the same direction, a correlation

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of +1 between the risk factors is assumed, and with movements in opposite directions, a correlation of -1 is assumed. The standard approach is thus a strong simplification of reality. The diversification effect based on the correlations between the risk factors is completely neglected, which results in a conservative risk calculation. If we tend to compare with the internal model, apart from the general requirements for risk management in trading and for derivatives, no further specific qualitative minimums are required.

The implementation must be carefully examined by the external auditor, in compliance with the capital adequacy regulations, and the results confirmed to the national regulator.

In the standard approach, the general and specific components of market risk for the equity- and interest-rate-sensitive instruments in the trading book are calculated separately. The different types of market risks can be defined as follows:

Specific Risk

It includes the risk that an individual debt or equity security may move more or less in the same manner as the general market in day-to-day trading (including period when the whole market is volatile). It also includes event risk (when the price of an individual debt or equity security moves precipitously relative to the general market. For example, on a takeover bid or some other shock event. Such events would also include the risk of default). The specific market risk corresponds to the fraction of market risk associated with the volatility of positions or a portfolio, that can be explained by events related to the issuer of specific instruments, and not in terms of general market factors. Price changes can thus be explained by changes in the rating (upgrade or downgrade) of the issuer or acquiring or merging partner.

Institutions model specific risks in accordance with the prerequisites limit themselves to capturing residual risks and do not capture event and default risks or capture them only partially. These institutions are subject to additional capital requirements for the specific risks of equity and interest-rate instruments. At the discretion of the institution, these may be determined using one of the following two approaches:

- Amount of VaR for equity and interest-rate portfolios,
- Amount of VaR for the specific risks inherent in the equity and interest-rate portfolio.

To determine the additional requirements, the amount of specific risk captured by the risk aggregation model for equity or interest-rate portfolio shall, in this case, correspond to one of the following:

- The increase in VaR for the related sub-portfolio caused by the inclusion of specific risks.
- The difference between the VaR for the related portfolio and the VaR, which
 ensues when all positions are substituted by positions whose fluctuation in
 value is determined exclusively through fluctuations of share market index or
 the reference interest-rate curve.
- The result of the analytical separation of general market risk from specific risk within the framework of a certain model.

For the purposes of determining those additional capital requirements, the general market risk for equities is to be defined by means of a single risk factor: a representative market index or the first factor or a linear combination of factors for the purposes of an empirical factor model. For interest-rate instruments, the general market risk shall correspond to the fluctuation of the reference curve per currency based upon an established liquid market.

The institution must opt for a method for determining the additional requirements for specific risks and apply this method on a continual basis.

If an institution convinces the local supervisory authority with a fully developed and tested model, it may be exempted form additional capital requirements for specific risks.

General Market Risk

General market risk corresponds to the fraction of market risk associated with the volatility of positions or a portfolio that can be explained in terms of general market factors, such as changes in the term structure of interest rates, changes in equity index prices, currency fluctuation, etc.

The capital adequacy requirements of the revised regulation assume that splitting of the individual risk components is possible. The credit risk components of market risk positions may not be neglected, as they are well regulated and require capital support.

Forward transactions have a credit risk if a positive replacement value (claims against the counterparties) exists. Off-balance-sheet positions have to be converted into the credit equivalents and supported by capital.

A critical condition for the application of the current market risk measurement regulations is the correct mapping of the positions. In order to do so, all tradingbook positions must be valued mark-to-market on a daily basis. In an additional step, all derivatives belonging to the trading book must be decomposed adequately to allocate the risk exposure to the corresponding risk factors. An aggregation between spot and forward rates requires the mapping of Forwards, Futures, and Swaps as combinations of long and short positions, in which the forward position is mapped as either of the following:

A long (or short) position in the underlying physical or fictive (example, derivatives) basis instruments.

An opposite short (or long) position in the underlying physical or fictive (example, derivatives) basis instruments.

An interest-rate swap can be decomposed as shown in figure 2.

Figure 2: Decomposition of an Interest-Rate Swap



In this example, a fixed-rate-receiver swap is decomposed in a long position, in which the bank receives from the swap counterparty a fixed coupon of 5 percent and pays a variable 3-month London Interbank Offered Rate (LIBOR) with monthly interest-rate resets.

The Internal Model Approach

In April 1995, Basel Committee presented a major extension of the market risk models. For the first time, it gave banks the option of using their own risk measurement models to determine their capital charge. This decision stemmed from a recognition that many banks have developed sophisticated risk management systems, in many cases far more complex than can be dictated by regulators. As for institutions lagging behind the times, this proposal provided a further impetus to create sound risk management systems.

To use this approach, banks have to satisfy various qualitative requirements, including regular review by various management levels within the bank and by regulators.

To summarize, the general market risk charge on any day 't' is:

$$MRC_{t} = \max\left(k - \frac{1}{60} \sum_{i=1}^{60} VaR_{t-i}, VaR_{t-1}\right) \qquad \dots (2)$$

Where, k is the multiplication factor determined by the supervisory authority, which can be set higher than its minimum of 3 if the supervisor is not satisfied with the bank's internal risk model.

To obtain total capital adequacy requirements, banks add their credit risk charges to their market risk charges applied to trading operations. Upon application, the local supervisory authority can authorize an institution to compute the capital requirements for market risks by means of risk aggregation models specific to each institution.

Risk aggregation models are statistical processes used for determining the potential changes in the value of portfolios on the basis of changes in the factors that determine such risks. In this connection, Value-at-Risk (VaR) is defined as that value which represents the maximum potential change in value of the total position, given a certain confidence level during a predetermined period of time.

The equity requirements for interest-rate and equity price risks in the trading book, and for foreign-exchange commodity risks throughout an institution, result from the aggregation of VaR-based capital charges and any applicable additional requirements for specific risks on equity and interest-rate instruments.

Should an institution desire to apply the Model-Based Approach, it should make application to the local supervisory authority and submit documentation demanded by that authority.

The local supervisory authority shall base its decision concerning its consent to use the model-based approach on the results of testing conducted under its aegis together with the banking law auditors. Furthermore, the local supervisory authority can base its decision on the review results of foreign supervisory authorities, other banking law auditors apart from those of the applicant, or other independent professional experts.

The approval to use the Model-Based Approach is dependent on certain conditions.

The costs associated with testing the model during the preapproval phase, as well as any subsequent necessary testing, are to be borne by the institution.

The local supervisory authority shall grant approval for the use of the model-based approach only if the following conditions have been met on a continual basis:

- The institution possesses a sufficient number of staff, familiar with complex models not only in the area of trading, but also in risk control, internal auditing, and back-office functions.
- The areas of trading, back office, and risk control possess an adequate Electronic Data Processing (EDP) infrastructure.
- The Risk Aggregation Model, in relation to the specific activities of the institution (composition of its trading book and its role within the individual markets – market maker, dealer, or end-user) is constructed on a sound basis and is correctly implemented.
- The precision of measurement of the Risk Aggregation Model is adequate.

The local supervisory authority can demand that the Risk Aggregation Model first be monitored during a specific time frame and tested under real-time conditions before it is implemented for the computation of capital requirements for market risks. This is to ensure that the following conditions are met:

- The risk factors set as minimum requirements are taken cognisance of by the Risk Aggregation Model.
- The Risk Aggregation Model corresponds to the set minimum quantitative requirements.
- The set minimum qualitative requirements are complied with.

After granting approval for the use of the Model-Based Approach, the local supervisory authority is to be notified whenever:

- Significant modifications are made to the Risk Aggregation Model.
- The risk policy is changed.

The local supervisory authority shall decide whether and when further verification is necessary.

In the past, banks have usually measured the risks in individual parts of their trading books separately. Nowadays, however, they are increasingly moving towards an integrated trading book approach, using a Value-at-Risk (VaR) model, which is a statistical approach to the evaluation of market risks. The aim of the VaR model is to calculate consistently the loss, with a specified probability over a specified holding period of time that a bank might experience on its portfolio from an adverse market movement. For example, such a model indicates that, with a confidence interval of 97.5 percent, corresponding to about two standard deviations from the mean, any change in portfolio value over one day resulting from an adverse market movement will not exceed a specified amount, given the relationships between assets holding over the observation period. VaR should therefore encompass changes in all major market risk components.

The VaR model retains the basic CAR philosophy of a 'hard link' between risk exposure and capital requirements set exogenously by the regulator. However, there is an important difference. In the traditional CAR approach, the regulator also sets the risk-weights, whereas, in the VaR approach, the risk weights are based on the banks' internal model. This amendment is addressed to overcome two weaknesses of the CAR approach – one, that it ignores diversification benefits accruing from holding assets of varying risk in the same portfolio and two, that it fails to efficiently exploit bank-specific internal information. However, the VaR model comes with its own price tag. The regulator has to ensure that the bank's internal model does not misrepresent its risk exposure and hence, a checking mechanism has to be in place.

Although the internal model approach represents an important advance over standardised risk measure, it still has important disadvantages that might impair its efficiency and effectiveness. The advantages of the internal model approach will be realised only if (a) the bank's internal risk measurement model is capable of providing an accurate measure of a bank's risk exposure over a holding period of concern to the regulators, and (b) the regulatory authority can verify that each bank's model is indeed providing such an accurate measure of the bank's risk exposure. In practice, it might well turnout that neither of these two conditions is completely satisfied.

Importantly, these models are not designed to measure the longer-horizon exposure, that is, the intended basis of regulatory capital requirements. Simply stated, longer horizon risk exposure depends not simply on a bank's initial risk exposure but also on its risk management strategy and the risk control systems that a bank has in place. Risks need to be measured and managed on a daily basis. However, the longer the horizon, the less important will be the initial risk exposure and the more important will be the management's risk objectives and the bank's risk management system. The internal model proposal sets the capital requirement at some multiple of the model risk estimate for an initial portfolio composition. This risk measure places undue emphasis on the initial portfolio at the expense of ignoring the importance of the bank's risk management objectives and the efficacy of its risk control systems.

Combination of Model-Based and Standard Approaches

Institutions wishing to use internal models must in principle possess a risk aggregation model which, at minimum, covers all risk factor categories (foreign exchange, interest rates, equity prices, and commodity prices) with respect to general market risks.

During the phase when an institution is migrating to the Model-Based Approach, the local regulator can allow it to combine the Model-Based and Standard Approaches under the condition that the same approach is applied within the same risk factor category, i.e., either the Model-Based or Standard Approach.

If positions in a certain risk factor category (such as commodities risk) are absolute and insignificant when considered relatively, the local regulator may also allow an institution not to integrate these into the Model-Based Approach, but to deal with them separately in accordance with the Standard Approach.

If the Model-Based and Standard Approaches are combined, the total capital requirement for market risks is arrived at through a simple addition of the capital requirements for each component.

The Pre-commitment Model

The debate on the appropriate risk measurement system took another turn when the US Federal Reserve Board proposed a Precommitment Approach (PA) to bank regulation in 1995. Under this third alternative, the bank would precommit to a maximum trading loss over a designated horizon. This loss would become the capital charge for market risk. The supervisor would then observe, after, say, a quarterly reporting period, whether trading losses exceeded the limit. If so, the bank would be penalized, which might include a fine, regulatory discipline, or higher future capital charges. Violations of the limits would also bring public scrutiny to the bank, which provides a further feedback mechanism for good management.

The main advantage of this "incentive-compatible" approach is that the bank itself chooses its capital requirement. As Kupiec and O'Brien have shown, this choice is made optimally in response to regulatory penalties for violations. Regulators can then choose the penalty that will induce appropriate behavior.

This proposal was welcomed as this approach explicitly recognizes the links between risk management practices and firm-selected deployment of capital. Critics, in contrast, pointed out that quarterly verification is very slow in comparison to the real-time daily capital requirements of the Basel proposals. Others worried that dynamic portfolio adjustments to avoid exceeding the maximum loss could exacerbate market movements in the same way that portfolio insurance supposedly caused the historical stock market crash of, 1987.

Pros and Cons of Market Risk Models

Regulators traditionally have utilised simple, generic models to measure bank capital adequacy. This is no longer possible, as the increased presence of market risk in banks and the opaqueness of such risk in a portfolio have rendered such an approach less than satisfactory. Three main alternative approaches have emerged in the literature to replace it. Out of them, VaR and PA have the potential for greater applicability in the Indian scenario. Each approach needs to be judged on the basis of the trade-off between the prevention of the costs of bank failure and the costs of implementation of such regulations.

The VaR concept can potentially be applied to both credit and market risk, thus allowing for the possibility that, in time, banks may be able to have a single firm-wide measure of these risks across all business areas, and so measure return on (credit and market) risk consistently across the whole firm. The concept, however,

has no substitute for the wider risk management process of analysing stress scenarios and keeping tabs on operational and legal risks. For example, neither the VaR nor the other approach offers a direct solution to the problem of operating risk – the existence of sloppy internal controls which have been responsible for many of the recent problems involving derivatives (Stephanou, 1996).¹

The internal model approach based on VaR is an improvement to the BBA, since it is aligned to bank industry best practice. However, attempts by regulators to create consistent estimates of VaR across different institutions' models, as well as their conservative parameters, have reduced the appeal of the approach. In addition, at least in the near future, its application will be limited to a relatively small number of institutions that have both material trading activities and sophisticated, comprehensive VaR models (Crouhy et al., 1997).

In contrast to the aforesaid model, which supports model-based regulation, the pre-commitment approach bypasses the micro-management of banks' models, focusing instead on outputs. If appropriate incentive compatible penalties can be devised, the incentives for gaming by banks, present in different ways and to varying degrees under both the BBA and the IMA (Internal Models Approach), are significantly reduced. It is necessary though for the PA to be further examined and refined, given the severe doubts that still exist over the implications of its adoption in practice² For instance, the PA proposal has been criticised on grounds that *ex post* penalties are particularly limited in situations of undercapitalization (Daripa et al., 1997).³

Box 1: Value-at-Risk (VaR) RBI Guidelines

The Reserve Bank of India has laid certain guidelines regarding the application of the Value-at-Risk (VaR) framework in the Indian banking scenario. Before going to the detailed analysis of the estimation of managing market risk with the help of value at risk, let us first try to understand what Value-at-Risk is all about.

The basic definition of VaR says that it is "an estimate of potential loss in a position or asset/liability or portfolio of assets/liabilities over a given holding period at a given level of certainty". As it has already been stated that risk is defined as the probability of the unexpected happening or in other words the probability of suffering a loss. VaR is an estimate of the loss that is likely to be suffered, and not the actual loss. The actual loss may be different from the estimate. Thus one can safely say that VaR measures potential loss, and not potential gain. Risk management tools measure potential loss as risk has been defined as the probability of suffering a loss. VaR measures the probability of loss considering a given time period over which the position is held. The given time period can range from one day to a few days or a few weeks or a year. VaR tends to change if the holding period of the instrument as well as the liquidity of the market.

As per existing information, regulatory agencies are thinking in terms of n-day VaR models, 'n' often being 15. This should ameliorate the problem to an extent.

² A Pilot Project of the Pre-commitment Approach was organised by the New York Clearing House Association and ten participating institutions (Considine, 1998). The exercise demonstrated that (a) the PA is a viable alternative to the internal models approach for establishing the capital adequacy of a trading business for regulatory purposes, (b) while there were differences in each institution's perception of determining an appropriate amount of capital (free of any regulatory pre-conceptions), the institutions believed that such differences arose from differences among the institutions in the nature of their trading books, the varying risk appetites and risk management techniques, differing ratios of proprietary trading revenues to customer flow revenues among firms and different views as to the relationship between economic and regulatory capital.

³ Rochet (1999) has provided a theoretical perspective on the relationship between the IMA and PA. As Rochet observes, the PA is an "indirect mechanism" while the IMA is a "direct mechanism" in the terminology of mechanism design. The two ought to be equivalent if the risk structure changes quickly over time and the regulators lack the expertise to see through internal models.

With the help of VaR, one can estimate with varying degrees of certainty about the potential loss that will not exceed a certain amount. This implies that VaR will tend to change with different levels of certainty. An important point to be noted here is that the "Bank for International Settlements" (BIS) has accepted VaR as a measurement of market risks and provision of capital adequacy for market risks, subject to approval by banks' supervisory authorities.

As a step towards enhancing and fine-tuning the existing risk management practices in banks, two Working Groups were constituted in Reserve Bank of India in the year 2001, drawing experts from select banks and FIs for preparing detailed guidance notes on credit risk and market risk management by banks. The Working Groups have identified further steps which are required to be taken by banks for improving their existing risk management framework, suiting to Indian conditions. On the basis of feedback received from the members of the Working Group, a draft was placed on the website of RBI for comments by banks and other market participants. The finalized and approved guidelines were circulated by RBI, with instruction to place them at the board meetings of respective banks.

Market Risk Management provides a comprehensive and dynamic framework for measuring, monitoring and managing liquidity, interest rate, foreign exchange and equity, and commodity price risks of a bank that needs to be closely integrated with the bank's business strategy. Market Risk may be defined as the possibility of loss to a bank caused by changes in the market variables. The BIS defines market risk as, "the risk that the value of on-or off-balance-sheet positions will be adversely affected by movements in equity and interest rate markets, currency exchange rates and commodity prices." Thus, Market Risk is the risk to the bank's earnings and capital due to changes in the market level of interest rates or prices of securities, foreign exchange and equities, as well as the volatilities of those prices. An effective market risk management framework in a bank comprises risk identification, setting up of limits and triggers, risk monitoring, models of analysis that value positions measure market risk, risk reporting, etc. In the guidelines relating to market risk, the RBI covered the following:

- i. Guidelines for evolving a risk-management structure,
- ii. Credit Risk (including credit risk in investment banking and off-balance sheet exposure),
- iii. Inter-bank Exposure and Country Risk,
- iv. Market Risk,
- v. Liquidity Risk,
- vi. Interest Rate Risk (IRR),
- vii. Foreign Exchange (Forex) Risk,

viii. Operational Risk.

Source: The Reserve Bank of India.

THE INDIAN EXPERIENCE

With regard to the Indian experience, three sets of issues need to be delineated. The first is the issue of risk management for the banking system in India. The second is the approach towards such risk management. The final issue pertains to the various kinds of market risks and their management.⁴

Pre-liberalization, market risk (and interest rate risk, in particular) was not much of a concern since the high Statutory Liquidity Ratio (SLR) meant that banks' investment in Government paper ensured them a steady stream of (interest) income. Taken together with the ceiling on borrowing in call money market and

⁴ The BCBS (1996) defined market risk as "the risk of losses in on and off-balance sheet positions arising from movements in market prices".

the regulated interest rate regime, this provided the balance sheets of banks with sufficient liquidity. At the same time, the prescription to keep foreign exchange positions square at the end of the day insulated banks from the dangers arising out of liquidity or margin mismatches on account of volatile rates. All in all, credit risk and to a lesser extent, operational risk, were the major risk factors facing banks in the regulated regime.

The era of administered regime having given way to one of deregulation and integration has meant that the banking sector has become increasingly susceptible to the vicissitudes of the global operating environment. The dichotomy in the structure of deposit liabilities and loan portfolios in which the liabilities are fixed vis-à-vis the floating rate character of the loan portfolio has exposed their balance sheet to interest rate risks. Secondly, with growing integration of forex markets with the domestic ones, and with banks being allowed to create liabilities and assets in multi-currencies, foreign exchange risks have also come to the fore. Thirdly, with the freedom given to banks to invest in bonds, shares and debentures of corporates, price risk has also become an area of prime concern.⁵

The money and foreign exchange markets have become intrinsically linked to each other, especially in view of commercial banks' dominant presence in both markets. The linkage between the call money market and the foreign exchange market which existed in the past as banks were permitted to maintain nostro account surpluses or overdrafts to some extent, has strengthened in recent times, particularly after the permission to borrow or lend up to 15 percent of Tier-I capital overseas.

In view of the growing incidence of market risks, which are capable of developing themselves into systemic risks, there has been growing concern among regulators to devise ways of quantifying such risks. The growing incidence, severity and bouts of financial crises have meant a refocusing of strategy among central banks towards safeguarding financial stability, with an overt emphasis on banking sector stability. The collapse of the Barings Bank that did have CAR more than 8 percent at the end of 1993, also underscored the importance of market risk. Not surprisingly, this has led the Basel Committee on Banking Supervision (BCBS) to develop new sets of capital requirement to ensure that banks have adequate capital to address market risk.

The new Accord allows a number of different options for calculating minimum capital requirements, and it seeks to provide incentives for banks themselves to continuously improve their internal risk management capabilities. Common to all these options is a greater differentiation between loans of different qualities. While the minimum regulatory risk-weighted capital ratio, at 8 percent, has been left unaltered, it has been proposed that the risk weights used to compute risk-weighted assets and the scope of the risks included be sufficiently broadened. Accordingly, in the new proposal, the CAR denominator is the sum of credit risk, operational risk and importantly, market risk (as opposed to only credit risk in the denominator, earlier).

Mention may be made in this context that the Narasimham Committee on Banking Sector Reforms (1998) had addressed the issue of risk and its management in its report. In the words of the Committee, "Banks should be encouraged to adopt statistical risk management techniques like Value-at-Risk in respect of balance

⁵ The Standing Technical Committee of the Reserve Bank and the Securities and Exchange Board of India (SEBI), in its Report, submitted to the Reserve Bank in August 2000, has sought to develop an approach to optimise the risk-return trade-off of banks front their investments in the capital market. Accordingly, banks' total exposure to capital market by way of investments in shares, convertible debentures and units of mutual funds (other than debt funds) should not exceed 5 percent of the banks' total outstanding credit (as at year-end) of the previous year. The decision on investment in shares, debentures etc., would have to be made by the Board/ALCO of each bank, keeping in view the permitted tolerance levels of mismatch.

Managing Market Risk in Banks

sheet items which are susceptible to market price fluctuations, forex rate volatility and interest rate changes". Subsequently, the Reserve Bank had issued risk management guidelines for the banks in India in October 1999. The guidelines broadly cover management of credit, market and operational risks. In conjunction with the guidelines on Asset-Liability Management (ALM) system, the present set of guidelines were purported to serve as a benchmark to the banks, which were yet to establish an integrated risk management system.

As regards positioning appropriate risk management strategies, several points need to be considered. First, in view of the worldwide trend towards centralising risk management with integrated treasury management to internalise the information synergies on various facets of risks, the primary responsibility of understanding the risks run by the bank and their pro-active handling needs to be vested with the Board of Directors. Secondly, at the organisational level, the Risk Management Committee needs to be entrusted with the task of identifying, measuring and monitoring the risk profile of the bank. In order to safeguard against unforeseen contingencies, the Committee would need to design stress scenarios to measure the impact of unusual market conditions and monitor the variance of the portfolio within tolerable limits. However, given the wide heterogeneity among balance sheet items of banks in India, risk management in individual banks would need to be dovetailed with the bank's own requirement, dictated by the size and complexity of business, market perception and the existing level of capital.

As discussed earlier, the various kinds of market risks that have assumed importance in the deregulated scenario are liquidity risk, interest rate risk, exchange rate risk and commodity price risk. Most commercial banks make a clear distinction between their trading activity and their balance sheet exposure. The Mid-term Review of Monetary and Credit Policy for the year 2000-2001 has announced detailed guidelines for categorization and valuation of banks' investment portfolio (comprising SLR and non-SLR securities). These guidelines require banks to classify the entire investment portfolio into three categories, viz., Held for Trading, Available for Sale and Held to Maturity. Out of the three, the 'Held to Maturity' should not exceed 25 percent of total investments and need not be marked to market. On the other hand, banks have been given the freedom to decide the extent of holdings under 'Held for Trading' and 'Available for Sale' categories.

The individual scrips under 'Available for Sale' will need to be marked to market at year-end or more frequent intervals, whereas the individual scrips 'Held for Trading' will have to be revalued at monthly or at more frequent intervals.⁶ This is expected to lower both the portion of banks' portfolios subject to market risk and also act as a risk management device. As regards trading book, Value-at-Risk (VaR) is presently considered to be the standard approach. The VaR method is employed to assess the potential loss that could crystallize on trading position or portfolio due to variations in market interest rate and prices. For balance sheet exposure to interest rate risk, 'Gap Reporting System' is quite popular, as the asymmetry of repricing of assets and liabilities results in a gap. This is often supplemented with the 'Duration Gap Analysis' as well as balance sheet simulation models to investigate the effect of interest rate variation on reported earnings over a medium-time horizon. The simulation reports the resultant deviations in earnings associated with the different rate scenarios considered, are commonly measured in terms of Earnings-at-Risk (EaR).⁷

⁶ The details are contained in the Mid-term Review of the Monetary and Credit Policy for the year 2000-01, Reserve Bank of India.

⁷ Earnings-at-Risk (EaR) refer to a percentage change in net interest income in response to a percentage point increase in interest rates.

SUMMARY

- The important risk faced by the banks in normal operations is the credit risk and the market risk. Credit risk involves the risk that loans will not be repaid by the customers and the market risk is the risk of losses arising from adverse movements in market prices.
- Value-at-Risk helps the organization to measure the risk in trading portfolios. These models are designed to estimate, for a given trading portfolio, the maximum amount that a bank could lose over a specific time period with a given probability. But the RBI has laid certain guidelines regarding the application of the Value-at-Risk (VaR) framework in the Indian banks. The other methods adopted in the measurement of portfolio risk are – Historical simulation, Monte Carlo Simulation and Parametric VaR Estimating the Volatility.
- The two types of market risks are specific risk and general risk. Specific risk is the risk of an individual debt or equity security moving by more than or less than the general market in day-to-day trading. General risk corresponds to the fraction of market risk associated with the volatility of positions or a portfolio that can be explained in terms of general market factors.
Chapter IV

Managing Interest Rate Risk

After reading this chapter, you will be conversant with:

- Types of Interest Rate Risks
- Gap Methodology
- Duration Analysis

Due to the very nature of its business, a bank should accept interest rate risk not by chance but by choice. And when the bank has to take risk as a choice, firstly, it should ensure that the risk taken is firstly manageable and secondly, it does not get transformed into any other undesirable rsk. As stated earlier, the focal point in managing any risk will be to understand the nature of the risk. This is especially essential for interest rate risk management. Interest rate risk is the gain/loss that arises due to sensitivity of the interest income/interest expenditure or values of assets/liabilities to the interest rate fluctuations.

TYPES OF INTEREST RATE RISKS

The sensitivity to interest rate fluctuations will arise due to the mixed effect of a host of other risks that comprise the interest rate risk. These risks when segregated fall into the following categories:

Rate Level Risk: During a given period there is a possibility for restructuring the interest rate levels either due to the market conditions or due to regulatory intervention. This phenomenon will, in the long run, affect decisions regarding the type and the mix of assets/liabilities to be maintained and their maturing periods.

The present interest rate restructuring taking place in the Indian markets is a very good example of this aspect. The Reserve Bank of India which is the apex body regulating the Indian monetary system, has been lowering the Statutory Cash Reserve Ratio for banks in a phased manner from 12 percent to 8 percent since 1996. Every time the CRR is lowered, there is an increase in the liquidity which further resulted in the lowering of the interest rate levels. A 2 percent cut in the CRR from 10 percent to 8 percent in the Busy Season Credit Policy announced in October, 1997 was immediately followed by a cut in the PLR/interest rates of Banks and FIs. The risk that arises due to this reduction can be understood from the fact that the revised rates of interest will be applicable to all the new deposits which will lower the marginal cost of funds. However, the affect will be seen on all the existing assets. Consequently, the loss of interest income on assets is likely to be higher than the reduction in interest cost of deposits leading to lower spreads.

Volatility Risk: In addition to the long run implications of the interest rate changes, there are short-term fluctuations which are to be considered in deciding on the mix of the assets and liabilities, the pricing policies and thereby the business volumes. However, the risk will acquire serious proportions in a highly volatile market when the impact will be felt on the cash flows and profits. The 1994 volatility witnessed in the Indian call money market explains the presence and the impact of the volatility risk. The interest rates in the call money market, which generally hovered at around 5-7 percent, zoomed to 95 percent, within a couple of weeks during September, 1994. While some banks defaulted in maintenance of CRR, many banks borrowed funds at high rates which had substantially reduced their profits. Thus, it can be seen that the effect of fluctuations in the short-term has a greater impact since the adjusting period is very short.

Prepayment Risk: The fluctuations in the interest rate may sometimes lead to prepayment of loans. For instance, in a situation where the interest rates are declining, any cash inflows that arise due to prepayment of loans will have to be redeployed at a lower rate invariably resulting in lowered yields.

Call/Put Risk: Sometimes when funds are raised by the issue of bonds/securities, it may include call/put options. A call option is exercised by an issuer to redeem the bonds before maturity, while the put option is exercised by the investor to seek redemption before maturity. These two options expose to a risk when the interest rates fluctuate. A call option is generally exercised in a declining interest rate scenario. This will affect the bank if it invests in such bonds since the intermediate cash inflows will have to be reinvested at a lower rate. Similarly, when the investor exercises the put option in an increasing interest rate scenario, the bank which issues the bonds will have to face greater replacement costs.

Managing Interest Rate Risk

Reinvestment Risk: This risk can be associated to the intermediate cash flows arising due to the payment of interest, installment on loans, etc. These intermediate cash inflows arising from a security/loan are usually reinvested and the income from such reinvestment will depend on the prevailing rate of interest at the time of the reinvestment and the reinvestment strategy. Due to the volatility in the interest rates, these intermediate cash flows when received may have to be reinvested at lower interest rates resulting in lower yields. This variability in the returns from reinvestment due to changes in the interest rates is called the reinvestment risk.

Basis Risk: When the costs of liabilities and the yields of assets are linked to different benchmarks resulting in a floating rate and there is no simultaneous matching movement in the benchmark rates, it leads to basis risk. For instance, consider that the funds raised by way of 1-year bank deposits are invested in the Easy Exit Bond of the IDBI flexibond issue. In this case, the cost of funds for 1-year bank deposits will be 9 percent (1 percent less than the prevailing Bank Rate of 10 percent), while the yields from the bond will be 14.55 percent which is 1.5 percent over 10-year government bond of 13.05 percent. With these floating rates of interest, on the assets and liabilities a spread of 5.55 percent (14.55 – 9 percent) is available. Assume that there is a 1 percent cut in the bank rate. This will bring down the cost of funds to 8 percent. Further, assume that the return on 10-year government bond to 12.75 percent, thereby bringing down the return on the Easy Exit Bond to 14.25 percent. As a result of this interest rate change, the spread will increase to 6.25 percent. While bank rate declined by 1 percent, the yield on 10-year government security came down only by 30 bp.

Thus, when the change in the interest rates, which are set as a benchmark for assets/liabilities is not uniform, it will lead to a decrease/increase in the spreads.

Real Interest Rate Risk: Yet another dimension of the interest rate risk is the inflation factor which has to be considered in order to assess the real interest cost/yields. This occurs because the changes in the nominal interest rates may not match with the changes in inflation.

The presence of the above mentioned risks will either individually or collectively result in interest rate risk. These risks will affect the income/expenses of the bank's asset/liability portfolio. This, further, will also have an impact on the value of the assets and liabilities of the bank, thereby affecting even the market value of the bank. This chapter discusses the impact of rate fluctuations on the bank's NII and its market value.

INTEREST RATE RISK MANAGEMENT

Mere identification of the presence of the interest rate risk will not suffice. A system that quantifies the risk and manages the same should be put in place so that timely action can be taken. Any delay or lag in the follow up action may lead to a change in the dimension of the risk i.e., lead to some other risks like credit risk, liquidity risk, etc. and make the situation uncontrollable.

Initiating the risk exposure control process is the classification of all assets and liabilities based on their rate sensitivity. For this classification, a bank should first be able to forecast the interest rate fluctuations. Based on these fluctuations, it should identify the rate sensitive assets/liabilities within the forecasting period. Thus, all assets/liabilities that are subjected to repricing within the planning horizon are categorized as Rate Sensitive Assets (RSAs)/Rate Sensitive Liabilities (RSLs). The need for repricing arises from the fact that in a going concern, all assets and liabilities are replaced as and when they mature.

Replacement of these assets/liabilities may subsequently lead to repricing especially in the following three situations:

- a. When assets/liabilities approach maturity;
- b. When the assets/liabilities have floating rate of interest;
- c. When regulations prescribe repricing.

When an *asset/liability is maturing*, the changing interest rate structure leads to revision of the price at which they are replaced. For example, the IDBI Flexi bonds issue consisted of the regular income bond with a face value of Rs.5,000 and having a coupon rate of 16 percent p.a. payable half-yearly. This bond has a maturity period of 10 years. Once the redemption date approaches, IDBI will have to replace the same by raising a liability at a rate which will be either lesser or greater than the 16 percent rate level.

Similarly, repricing becomes inevitable when the *asset/liability is priced at floating rate*. For instance, consider the Easy Exit Bond of the IDBI Flexi bonds issue. The coupon rate of this bond is fixed at 1.5 percent over 10-year Government Bond rate or 2.5 percent over 3-year FD rate of SBI, whichever is higher. Thus, any change in the Government bond rate/SBI FD rate leads to a corresponding change in the rate of the Bond.

In addition to these, changes in the *regulatory framework in certain cases may lead to repricing*. Consider the busy season credit policy of the RBI announced in October, 1997 where there was a cut in the bank rate by 1 percent. The refinance extended by the RBI to Banks gets repriced because of this change.

Replacement of the assets/liabilities subsequently leads to repricing which explains their sensitivity to rate fluctuations. The need for such a classification of assets and liabilities based on their sensitivity is essential since a consequential affect of the rate fluctuation is its impact on the net income of the firm.

There are two aspects that need to be taken care of in order to understand the total impact of the rate fluctuation on the net income. These two aspects refer to the affect of the rate changes on the non-interest income and the interest income. In the first case, there can be a rise/fall in the non-interest income since rate fluctuations affect the value of the assets/liabilities. While in the second case, the interest rate changes will in certain situations create a mismatch in the pricing of the assets and liabilities which affect the net interest income.

Thus, it can be observed that the effect of rate fluctuations is extended to both the balance sheet and the income statement of a financial intermediary. However, while measuring the interest rate risk, greater emphasis is laid on its effect on interest income. This is due to a high degree of correlation between the rate fluctuations and their effect on RSAs/RSLs which further gives greater scope for maneuverability.

Once the bank is exposed to the interest rate risk, the immediate step to be followed is the quantification of the same by means of a suitable methodology. Some of the approaches used to tackle interest rate risk are given below and a discussion on the same is follows.

Approaches adopted to quantify Interest Rate Risks:

- Maturity Gap Method
- Rate Adjusted Gap
- Duration Analysis
- Hedging
- Sensitivity Analysis
- Simulation and Game Theory.

Maturity Gap Method

This asset-liability management technique aimed to tackle the interest rate risk, highlights the gap that is present between the RSAs and the RSLs, the maturity periods of the same and the gap period. The objective of this method is to stabilize/improve the net interest income in the short run over discreet periods of time called the gap periods. The first step is thus, to select the gap period which can be anywhere between a month to a year. Having chosen the same, all the RSAs and RSLs are grouped into 'maturity buckets' based on the maturity and the time until the first possible repricing due to change in the interest rates. The gap is then calculated by considering the difference between the absolute values of the RSAs and the RSLs, which is mathematically expressed as:

RSG = RSAs - RSLs	Eq. (1)
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$$Gap Ratio = RSAs/RSLs \qquad ...Eq. (2)$$

Where.

RSG = Rate Sensitive Gap based on maturity.

The gap so analyzed can be used to cut down the interest rate exposure in two ways. As mentioned earlier, the bank can use it to maintain/improve its net interest income for changing interest rates, otherwise adopt a speculative strategy wherein by altering the gap effectively depending on the interest rate forecasts, net interest income can be improved. Either way, the basic assumption of this model is that there will be an equal change in interest rates for all assets and liabilities.

During a selected gap period, the RSG will be positive when the RSAs are more than the RSLs, negative when the RSLs are in excess of the RSAs and zero when the RSAs and RSLs are equal. Based on these outcomes, the maturity gap method suggests various positions that the treasurer can take in order to tackle with the rising/falling interest rate structures. Consider the following illustration to understand the approach:

Illustration 1

In the illustration given below, for the three different gap positions, i.e., positive, negative and zero, the impact of rate fluctuations i.e., a rise or a fall, on the NII are explained.

Liability	Rate %	Increased	Decreased	Asset	Rate	Increased	Decreased
		rate %	rate %		%	rate %	rate %
200				200			
1800*	10	11	9	800*	12	13	11
2000	11	11	11	1000*	14	15	13
				1000*	16	17	15
				1000	18	18	18
4000				4000			
Interest Expense	400	418	382	Interest Income	576	604	548
Net Inte	rest Inco	ome**			176	186	166
RSAs	: Rs	.2,800					
RSLs	: Rs	.1,800					
GAP	: Rs	.1,000.					

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Option II: Negative Gap

(Rs. in Crore)

Liability	Rate %	Increased rate %	Decreased rate %	Asset	Rate %	Increased rate %	Decreased rate %
200				200			
1800*	10	11	9	800*	12	13	11
2000	11	11	11	1000	14	14	14
				1000	16	16	16
				1000	18	18	18
4000				4000			
Interest Expense	400	418	382	Interest Income	576	584	568
Net Interes	st Incon	ne**		meome	176	166	186

RSAs : Rs.800

RSLs : Rs.1,800

GAP : (1,000).

Option III: Zero Gap

(Rs. in Crore)

Liability	Rate %	Increased rate %	Decreased rate %	Asset	Rate %	Increased rate %	Decreased rate %
200				200			
1800*	10	11	9	800*	12	13	11
2000	11	11	11	1000*	14	15	13
				1000	16	16	16
				1000	18	18	18
4000				4000			
Interest Expense	400	418	382	Interest Income	576	594	558
Net Interes	ne**			176	176	176	

RSAs : Rs.1,800

RSLs : Rs.1,800

GAP :

(* Represent RSAs and RSLs,

** Net Interest Income,

(NII) = Interest Income – Interest Expense)

0.

The following are the implications of an increase/decrease in interest rates for a given RSG level:

RSG is Positive

When RSG is positive it is understood that the yield earned in such a situation will be more than the rate at which the liabilities are serviced. In the illustration given above, option I, has a positive gap of Rs.1,000 crore. Initially, the cost of funds is Rs.400 crore, while the total returns are Rs.576 crore, resulting in a NII of Rs.176 crore. This will, however, be affected by changes in the interest rates. When the interest rates rise/fall by equal amounts, then the increase/decrease in the interest income will be more than the servicing costs of liabilities, merely due to the fact that there are more repriceable assets than the repriceable liabilities.

RSG is Negative

In the second situation where the RSG is negative, an increase/decrease in the interest rates by an equal amount will lead to a greater rise/fall in the interest expenses than the interest income earned. The presence of more RSLs as compared to the RSAs explains this phenomenon. Consider option II, where, the RSAs and RSLs are Rs.800 crore. and Rs.1,800 crore. respectively resulting in a negative gap of Rs.1,000 cr. When there is a negative gap, the consequence of a rate fluctuation is a decrease in the net interest income when the interest rates rise and an increase in the same when the rates fall.

RSG is Nil

As a third option, the bank can maintain a zero gap and thus remain neutral to the interest rate fluctuations. It can be observed in, Option III, of the illustration that when the RSAs and the RSLs are equal to Rs.1,800 crore, the NII remains at Rs.176 crore, in a rising/falling interest rate scenario.

The utility of the Maturity Gap approach is that for a given level of RSG and with a forecast of a rise/fall in interest rates, the banker can take the following positions to improve the net income:

- Maintain a positive gap when the interest rates are rising;
- Maintain a negative gap when the interest rates are on a decline;
- Alternatively, maintain a zero gap position for the firm to ensure a complete hedge against any movements in the future interest rates. Though this policy will reduce the interest rate risk to a large extent, it will not lead to any speculative gains. While such a situation may not occur in reality, it will also be unwarranted since there are no major benefits arising from it.

The process of maturity gap approach discussed above assesses the impact of a percentage change in the interest rates on the NII.

The relationship is given by,

 $\Delta \text{ NII} = \text{Gap x } \Delta \text{r} \qquad \dots \text{Eq. (3)}$

Where,

 Δ NII = Change in net interest income

 Δr = Change in interest rates.

Consider Option I of illustration 1

Gap	Change in interest rate	Change in NII
+ 1000	Increase by 1 percent	1000 x 0.01 = 10
+ 1000	Decrease by 1 percent	1000 x - 0.01 = -10

However, the objective of an ALM policy will be to maintain the NIM within certain limits by managing the risks. And since risks are an inherent quality of the banking business, it implies that the bank should first decide on the maximum and minimum levels for the NIM. Following this will be an ALM technique which allows a bank to take various risk exposure levels and still remain within the limits set for NIM.

While the above helps in quantifying the interest rate risk, it is more relevant for a bank to identify the gap which it should target for a given forecast of interest rate change. For this purpose one has to go through the following steps:

- Assess the percentage change in NIM that is acceptable to the bank;
- Make a forecast for the quantum and direction of the interest rate change;
- Based on the above determine the gap level (positive/negative).

We are aware that NII is affected by the Net Interest Margin (NIM) and the Earning Assets.

The bank has to decide as a matter of policy the percentage variation in NIM which is acceptable/tolerable. Let that percentage be indicated by Δc . Then acceptable variation in the value of NII is given by,

$$\Delta NII = \text{Earning Assets x NIM x } \Delta c$$

Since,
$$\Delta NII = \text{Gap x } \Delta r$$

Gap x
$$\Delta r = \text{Earning Assets x NIM x } \Delta c$$

Therefore,

$$Gap = \frac{\text{Earning Assets x NIM x } \Delta c}{\Delta r} \qquad \dots \text{ Eq. (5)}$$

Where,

Earning A	ssets	= Total Assets of the bank
NIM	=	Net Interest Margin
Δc	=	Acceptable change in the NIM
Δr	=	Expected change in interest rates.

At the outset it must be clear that the above computation of gap is with reference to future and hence all the above parameters are estimates.

- Earning assets represent the projected level of assets, either absolute or average levels collected from the bank's short-term forecasts like credit budget.
- NIM represents the margin projected for the relevant period.
- Δc is a policy variable to be decided by the top management of the bank.
- Δ r is a variable which is obtained by using the forecasting techniques and is provided by the specialist officer.

The following illustration helps in explaining the above:

Illustration 2

AFC Banking Corporation Ltd. has earning assets worth Rs.1,980 crore and a Net Interest Margin (NIM) of 4 percent. In a policy decision made by the Bank it has been decided that a 2.5 percent increase/decrease in the NIM can be the acceptable limit. It further forecasts a 0.75 percent increase in the interest rate. Assess the target gap which the company can maintain to remain within the acceptable limits of the NII.

Solution

Given this information, the target gap can be assessed as follows:

Target Gap =
$$\frac{\Delta c \ x \ (Earning \ Assets \ x \ NIM)}{Change in interest rate}$$

$$= \frac{0.025 \times 1980 \times 0.04}{0.0075} = \text{Rs.264 crore.}$$

Thus, the company can maintain a Rs.264 crore gap in order to manage the interest rate exposure for a 0.75 percent increase in interest rate. Since the forecast is an increase in interest rates, the bank should attempt to maintain a positive gap of Rs.264 crore.

Though this Maturity Gap method is the most widely used approach to tackle interest rate risk, there are a few limitations in this process that need to be borne in mind before adopting it as a measure to counter interest rate risk. The following are the limitations that are present in the Maturity Gap method:

- The success/failure of the maturity gap method in tackling the interest rate exposure depends to a large extent on the accuracy level of the forecasts made regarding the quantum and the direction of the interest rate changes. The accuracy will, however, be higher when the forecasts are made for shorter intervals of time. This also applies to other models.
- While gap measurement is an easy task, gap management is not. Having forecasted the interest rate movement to the nearest possible accuracy level, the treasurer may not have the flexibility in managing the gap so as to effectively produce the targeted impact on the net interest income. Further, it also assumes that there will be an equal change in interest rates for all RSAs and RSLs.
- It assumes that the change in the interest rates is immediately affecting all the RSAs and RSLs by the same quantum which is not always the case in reality.
- This model ignores the time value of money for the cash flows occurring during the gap period.
- In reality, the market value of even those assets/liabilities which are not repriced during the gap period will be affected. For instance, when an investment is made in a bond with a 15 percent coupon rate, a rising interest rate scenario implies better investment opportunities other than the bond. This may lead to fall in the value of the bond. By ignoring these assets/liabilities, the Gap method does not consider the total risk arising from the interest rate fluctuations.

We have earlier mentioned that gap ratio eq. (2) can also be computed along with gap. Gap ratio by its definition can indicate whether the bank has a positive gap or negative gap but it does not help in quantifying the risk involved. Gap ratio cannot be effectively used to counter the interest rate risk since it ignores the size. The effect of rate fluctuations on the profitability of the company cannot be reflected in a gap ratio. Consider the following illustration of two banks which have a same gap ratio:

		(Rs. in Crore)
	Bank A	Bank B
RSAs	2700.00	900.00
RSLs	1800.00	600.00
GAP (RSAs – RSLs)	900.00	300.00
GAP Ratio (RSAs/RSLs)	1.50	1.50
NII	750.00	350.00
Decrease in interest (%)	0.75	0.75
Change in NII (Gap x Δ r)	- 6.75	- 2.25
% change in NII (Δ NII/NII)	0.9%	0.64%

Thus, it can be observed that in spite of a similar gap ratio in both the cases, a 0.75 percent decrease in the interest rate led to a greater fall in the NII of Bank A when compared to Bank B. This explains the fact that while the gap level can aid in taking positions to tackle a particular interest rate change, the gap ratio cannot do the same.

Given these limitations, a bank can adopt the Maturity Gap Method to tackle the interest rate fluctuations so that the impact on net interest income is monitored and managed.

Rate Adjusted Gap

The Maturity Gap approach assumes a uniform change in the interest rates for all assets and liabilities. In reality, however, it may not be the case basically due to two main reasons. Firstly, the market perception towards the change in the interest rate may be different from the actual rise/fall in the interest rates. For instance, if the bank rate is cut by 1 percent, according to the gap method, there will be a 1 percent fall in the rate of interest for both assets and liabilities. However, this may not be the case if the market perception for the decline in the interest rate is short-term in nature. This might eventually lead to a fall in the interest rate by less than 1 percent. Alternatively, the market may also perceive the rate fluctuations differently for the long-term interest rates and the short-term interest rates. For instance, rate fluctuation may lead to a 0.75 percent fall in the short-term interest rates while the long-term rates may witness a mere decrease by 0.25 percent.

The second reason for differential rise/fall in interest rates of assets/liabilities can be the presence of a certain regulation. To explain this further, consider the differential interest rate loan extended by banks which has an interest rate of 4 percent. This rate remains constant irrespective of any amount of fluctuation in the interest rate of the bank. Similarly, it is quite common to find that the interest rates on term deposits rise/fall with changes in interest rates though the same does not affect the interest paid on savings bank.

Having done away with the assumption of a uniform change in interest rates of assets/liabilities, the Rate Adjusted Gap methodology seems to be superior to the Maturity Gap methodology. In this approach, all the rate sensitive assets and liabilities will be adjusted by assigning weights based on the estimated change in the rate for the different assets/liabilities for a given change in interest rates.

Rate Adjusted Gap =
$$[RSA_1 X W_{A1} + RSA_2 X W_{A2} +]$$

- $[RSL_1 X W_{L1} + RSL_2 X W_{L2} +]$...Eq. (6)

Where,

 W_{A1} , W_{A2} = Weights of the corresponding RSAs

 W_{L1} , W_{L2} = Weights of the corresponding RSLs.

Consider the following illustration which measures the rate adjusted gap for option I of illustration 1.

Illustration 3

Positive Gap

						(Rs. i	n Crore)	
Liability	Rate	Increased	Weight	Asset	Rate	Increased	Weight	
(Rs.)	%	rate %		(Rs.)	%	rate %		
200				200				
1800*	10.00	10.75	0.75	800*	12.00	12.50	0.50	
2000	11.00	11.00		1000*	14.00	14.25	0.25	
				1000*	16.00	16.50	0.50	
				1000	18.00	18.00		
Rate Adju	isted Liab	oilities =	1,800 x 0.75 = 1,350					
Rate Adju	isted Asso	ets =	(800	x 0.50) + (1000 0.2	(1000)	(0.50)	
		=	1,150)				
Rate Adju	sted Gap	=	1,150	-1,350 =	(200)			

In this case, the interest rate change for the liability of Rs.1800 crore. is given as 0.75 percent (10.75 – 10.00). This implies that on account of rate fluctuation, the interest rate for that particular liability has increased by 0.75 percent. Thus the weight attached to this is 0.75. Similarly, for the asset valuing Rs.800 crore.

The weight assigned is 0.50 percent since the rate fluctuation led to an increase in the yield from 12 to 12.50 percent. The Gap will then be assessed from these rate adjusted assets and liabilities which is termed as the rate adjusted gap.

Thus, it can be observed from this illustration that by assigning weights, the positive gap has actually become negative. If policies were formulated to control the interest exposure based on the Maturity Gap methodology, it might actually lead to a different and a very serious situation by changing the nature and size of the risk.

DURATION ANALYSIS

One of the limitation of the Maturity Gap approach is that it ignores the time value of money for the cash flows while determining the gap. Attending to this limitation of the Maturity Gap approach is the Duration Gap method. Duration Analysis concentrates on the price risk and the reinvestment risk while managing the interest rate exposure. While managing these two risks, Duration Analysis studies the effect of rate fluctuation on the market value of the assets and liabilities and Net Interest Margins (NIM), with the help of duration.

As seen earlier, the concept of duration helps in immunizing the interest rate risk by holding an investment till the end of duration instead of maturity.

Having determined the duration, the effect of rate fluctuation on the NIM and the market value of the assets/liabilities of a bank can be assessed further by computing the Duration Gap for the portfolio of its assets and liabilities.

In the first case, to monitor the impact of rate fluctuation on NIM using duration, the method followed is similar to the one used in maturity gap approach. However, the Rate Sensitive Gap calculated in Duration Analysis is based on the duration and not the maturity of the assets and liabilities. Consider the following illustration 4.

Illustration 4

The following table shows the assets and liabilities position of FMG Finance Ltd. along with their durations and interest rates. Based on the information, identify the RSG and the NIM. During its forecasting period of one year, if the interest rates rise/fall by 2 percent, what would be its implication on the NIM of FMG Finance?

Liabilities	Amount	Duration in Months	Interest rate %	Assets	Amount	Duration in Months	Interest rate %
Equity	150	-	-	Cash	400	-	-
Short-term deposits	2400	5.5	11.5	Short-term loans	1800	2.75	12.5
Long-term deposits	1200	23.7	15.0	Long-term loans	1650	23.00	16.5
Other liabilities	850	11.5	11.0	Investments	600	10.50	13.5
				Fixed assets	150	—	-
	4600				4600		

(Rs. in Crore)

Solution

RSG = RSAs - RSLs

All assets and liabilities that have a duration of less than one year (forecast is for one year) are rate-sensitive since any change in the interest rates will affect the corresponding interest rates of these assets and liabilities. Thus, the RSAs of FMG Finance are short-term loans and investments while the RSLs are short-term deposits and other liabilities.

RSG = (1800 + 600) - (2400 + 850) = -Rs.850 crore

The RSG for FMG Finance is negative since the RSLs are greater than the RSAs.

Table 1 given below computes the existing NIM, NIM with a 2 percent increase/decrease in the interest rate.

Table 1

										(R	s. in Crore)
Liabilities	Amount	Duration in months	Interest rate (%)	Increased Int. rate (%)	Decreased Int. rate (%)	Assets	Amount	Duration in months	Interest rate (%)	Increased Int. rate (%)	Decreased Int. rate (%)
Equity	150	-	-	-	-	Cash	400	-	-		
Short-term deposits	2400	5.50	11.50	13.50	9.50	Short-term loans	1800	2.75	12.5	14.5	10.5
Long-term deposits	1200	23.70	15.00	15.00	15.00	Long-term loans	1650	23.00	16.5	16.5'	16.5
Other liabilities	850	11.50	11.00	13.00	9.00	Investments	600	10.50	13.5	15.5	11.5
						Fixed Assets	150	-	-	-	-
	4600						4600				
Interest expense			549.50	614.50	484.50	Interest Income			578.25	626.25	530.25
NII			28.75	11.75	45.75						
NIM			0.006	0.003	0.010						

Thus, when the RSG, which is calculated based on the duration is negative, then a rise in the interest rates will decrease the NIM and *vice versa*.

Thus, the impact of rate fluctuation using the duration is similar to the maturity gap approach. However, the identification of RSAs and RSLs will be based on the duration rather than on the maturity of the assets/liabilities. The duration will, however, be considered for a period that is less than the planning horizon. In the above illustration, since the forecast is for one year, all assets and liabilities with duration less than a year are considered.

The impact of the bank on the NIM can further be assessed from the Duration Gap. When the Duration Gap is nil, the NIM of the firm remains protected for any changes in the interest rate. Further, a positive gap leads to a rise in the NIM, while the negative gap indicates a fall in the NIM.

Duration Analysis can further be used to study the sensitivity of the market value of assets and liabilities to the changes in the interest rates. Excess of assets over liabilities gives the gap/surplus available to the shareholders. Duration Analysis measures the duration of this surplus in order to assess the exposure of the shareholders' wealth to the interest rate risk.

Since the duration of the assets and liabilities have a linear relation to the weights of the composite assets and liabilities, and since surplus is given by the difference between the assets and liabilities, the duration gap can be represented as follows:

$$D_S x S = (D_A x A) - (D_L x L)$$
 ... Eq. (7)

Where,

 D_S = Duration Gap/Duration of Surplus

 $D_A = Duration of Assets$

 $D_L = Duration of Liabilities$

$$A = Assets$$

L = Liabilities

S = Surplus/Gap.

Substituting L = A - S in the above equation, we get

$$D_{S} = D_{L} + (A/S) x (D_{A} - D_{L})$$
 ... Eq. (8)

Thus, Duration Gap is the composite duration of liabilities and the multiple of the difference between composite duration of assets, and the composite duration of liabilities and the asset-surplus ratio.

Once the duration of the surplus is determined, the effect of the rate fluctuation on the market value of the asset/liability is calculated by the following method:

$$\Delta MV = \frac{-D(\Delta r) x \operatorname{Current} (MV)}{(1+r)} \qquad \dots \operatorname{Eq.} (9)$$

Where,

ΔMV	=	Change in market value
D	=	Duration of assets or liabilities
Δr	=	Change in the interest rate
r	=	Current rate of interest
MV	=	Market value.

The new value of the asset/liability will now be the sum of the original market value and the change in the market value as computed on the previous page.

New MV = Current MV +
$$\Delta$$
 MV ...Eq. (10)

Consider the following illustration which explains the computation of the duration of the surplus and also the effect of interest rate fluctuation on the market value of the firm.

Illustration 5

Following is the information provided by Sterling Fincorp Ltd.:

Market value of liabilities	=	Rs.1,800 lakh
Market value of assets	=	Rs.2,000 lakh
Duration of assets	=	5 years
Duration of liabilities	=	4 years
Interest rate	=	10 percent
Change in interest rates	=	+2 percent
Assess the change in the fluctuation.	market	value of the firm due to the interest rate
MV of equity	=	200 crore

Solution

The change in the market value of asset/liability can be assessed as follows:

Change in Market Value =
$$\frac{-D(\Delta r) x \operatorname{Current} (MV)}{(1+r)}$$

Where,

$$MV = Market value.$$

			(Rs. in lakh)
	Change in MV	Original MV	New MV
Assets	$\frac{-5(0.02) \times 200}{(1+0.1)} = 182$	2000	1818
Liabilities	$\frac{-4(0.02) \times 1800}{(1+0.1)} = 131$	1800	1669
Equity	182 - 131 = 51	200	149

The impact of rate fluctuation on SFL has been as follows:

- The fall in the value of the assets (9 percent) is greater than the fall in the value of the liabilities (7 percent);
- There has also been a decline in the equity value of the SFL;
- The capital ratio, which is the ratio of the surplus to the total assets, declined from 10 percent to 8.2 percent. This implies that there is a fall in the returns generated by employing the total assets.

One of the objective of an ALM strategy is to ensure that there is no fall in the value of the firm due to rate fluctuations. To meet this objective, Duration Analysis tries to immunize the effect of the rate fluctuation on the equity by maintaining its duration as nil. This neutral level is attained by adjusting the duration of assets and liabilities.

While adjusting the duration of assets and liabilities, the two obvious alternatives that arise are:

- A perfectly matched asset and liability duration;
- A mismatch in the duration of assets and liabilities.

Consider the first alternative to immunize the market value. According to the equation (7), the duration of surplus is given as follows:

 $D_{S} = D_{L} + (A/S) \times (D_{A} - D_{L})$

If the duration of assets and liabilities are perfectly matched, the equation will be as follows:

$$D_S = D_L = D_A$$

Thus, the duration of surplus will be equal to the duration of assets/liabilities (since $D_L = D_A$). Thus by matching the duration of assets and liabilities, the interest rate risk is not eliminated since the duration of surplus is not zero.

Since matching durations does not serve the purpose of eliminating the effect of interest rate risk on market value of the firm, consider the second alternative of a mismatch in the duration of assets and liabilities. According to equation (7), we have duration of surplus as follows:

 $D_{S} = D_{L} + (A/S) \times (D_{A} - D_{L})$

If the value of the firm is to remain the same irrespective of changes in interest rates, then D_{S} should be equal to zero.

 $D_{S} = 0 = D_{L} + (A/S) (D_{A} - D_{L})$

From the above equation we get,

 $D_A - D_L = -D_L/(A/S)$

On further simplifying the above equation, we get,

$$D_{A} - D_{L} = \frac{-D_{L} (A - L)}{A} \text{ (Since S = A - L)}$$

$$= -D_{L} + D_{L} \times \frac{L}{A}$$

$$D_{A} = D_{L} (L/A) \qquad \dots Eq. (12)$$

....Eq. (11)

or

From the above two equations, the following observations can be made:

By establishing an appropriate level of mismatch in the duration of assets and liabilities equation (11), or by arriving at the immunization, the duration of surplus can be equated to zero, thereby immunizing the market value of the firm for the interest rate fluctuations. This level of duration mismatch is known as the immunization mismatch. Further, using equation (12), the MV of equity can be immunized by changing the duration of assets. This level of asset duration is known as the Immunization Asset Duration (DA₂). Thus, the phenomenon of

attaining a neutral level of duration gap as explained by the above equations can be achieved by ensuring that the duration gap as computed above is equal to zero. This can be done either by adjusting the duration of any of the following:

- i. Assets
- ii. Liabilities or
- iii. Both Assets and Liabilities.

However, adjusting the duration of assets would be more easier than adjusting the duration of liabilities since there will be a third party involved in deciding the terms of the liability. And equations (11) and (12) can be used to adjust the duration of assets and to arrive at the duration mismatch.

Illustration 6

Consider illustration 5 and advice the firm on the position it can take to hedge the effect of rate changes on its market value using the (i) asset duration approach and (ii) duration mismatch approach.

Solution

Consider the immunization through asset duration to nullify the impact of rate fluctuation on market value of the firm.

 $D_{AZ} = D_L x (L/A)$

Where,

D_{AZ} = Immunizing Asset Duration

 D_L = Duration of Liabilities

A, L = Market Value of Assets and Liabilities respectively.

 $D_{AZ} = 4 x (1800/2000) = 3.6.$

Having computed the asset duration, the effect of interest rate fluctuation on market value of the bank can be calculated as follows:

			(Rs. in lakh)
	Change in MV	Original MV	New MV
Assets	$\frac{-3.6(0.02) \times 2000}{(1+0.1)} = 131$	2000	1869
Liabilities	$\frac{-4(0.02) x 1800}{(1+0.1)} = 131$	1800	1669
Equity	131 - 131 = 0	200	200

Immunization has nullified the effect of the rate fluctuations on the value of the firm and further has increased the capital ratio from 10 percent to 11 percent.

Immunization through mismatch

$$D_{A} - D_{L} = -D_{L}/(A/S)$$
$$= \frac{-D_{L}}{(2000/200)}$$
$$= -0.1D_{L}$$

 $D_{\rm A}-0.9D_{\rm L} \qquad = \quad 0.$

Thus, the company can maintain its market value if it has an immunization mismatch in such a way that the ratio of $D_A/D_L = 0.9$.

Duration analysis explains the inverse relation that exists between the duration gap assessed and the value of the bank for a given change in the interest rate structure. Thus, the sensitivity of the bank's equity to the interest rate fluctuation will be lesser when the duration gap is small. Thus the Duration Gap method is a comprehensive measure of the interest rate risk, since the risk of the entire

portfolio is assessed i.e., the assets, the liabilities and the surplus. This feature, when coupled with the time value of money that is considered for each cash flow, makes the approach more practical and superior to the maturity gap approach.

Nevertheless, the presence of some subjective assumptions in Duration Analysis expose the limitations of the approach. These limitations are as follows:

- Forecast of future cash flows is a prerequisite for computation of duration. The accuracy of these forecasts in case of loans is relatively low due to defaults and prepayments unlike in bonds.
- It will be necessary to identify different discount rates for different cash flows since the impact of rate fluctuations will be varying depending on the nature of assets.
- Once the duration is fixed for a portfolio, the duration will not decline in tandem with the passage of time. In other words, a passage of one year in time will not result in a decline of duration by one year. Hence, it requires continuous rebalancing of a portfolio. This increases the transaction costs.

Applicability: Since the duration gap concept studies the impact on the equity of the bank, it takes into account all the assets and liabilities. However, in the process of managing the equity value, the Duration Analysis does not lay much emphasis on managing the short run implications of interest rate risk on the NII. The concept of Duration Analysis is useful to the extent that it minimizes the interest rate sensitivity of the surplus or the equity of the bank. This would place it in a better situation while borrowing funds. However, the approach ignores the impact of the same on the NII of the firm in the short run. Thus, it is wise to adopt the duration gap method, but at the same time ensure that the NII of the firm is within the acceptable limits. Broadly speaking, it will be worthwhile to use maturity gap in the short run and duration gap in the long run.

Managing interest rate risk by changing the composition of the assets and liabilities, though feasible, involves transaction costs, unwanted size of the balance sheet and lack of flexibility. It is here one finds the advantage in using derivatives to hedge the interest rate risk.

Box 1

Gap Analysis technique is the most common measure of interest rate sensitivity. The maturity gap method technique measures the gap present in Rate Sensitive Assets (RSA) and Rate Sensitive Liabilities (RSL). The gap period is selected for a one month period or for a one year period. RSA and RSL are grouped into "maturity buckets" for the period considered based on the maturity and time, and the Rate Sensitive Gap (RSG) is measured, which is the difference between RSA and RSL.

RSG = RSA - RSL

The RSG can be positive or negative. A positive RSG means the yield earnings will be more than the rate at which the liabilities are serviced, and a negative RSG means the yield earnings are not sufficient to serve the liabilities and the bank is at risk. The negative RSG can be due to an increase or a decrease in the interest rate, which leads to a greater rise/fall in the interest expenses than the interest income earned. When RSG is nil, the bank is maintaining a nil gap, which means the risk is neutral to the interest rate fluctuations. The measure of RSA and RSL enables banks to assess the impact of the rate fluctuation in their Net Margin Interest (NMI), also known as the relative gap ratio or rate sensitivity ratio.

Source: ICFAI Research Center

Managing Interest Rate Risk

Hedging

It is often felt that a floating rate mechanism can minimize the interest-rate risk. Though this is true, it should, however, be noted that the possibility of the interestrate risk getting transformed into credit risk due to this mechanism is always present. This situation occurs as the floating rate passes the burden of the interestrate risk on to the borrower.

Yet another means of managing the interest-rate risk is by hedging with the use of derivative securities, viz., swaps, futures and options. This approach seems to be a better alternative, especially in a situation where there is a maturity mismatch. For instance, when liabilities are mostly short-term in nature and assets are long-term, the easier method of financing the assets, rather than trying to match the maturing periods, is by the use of derivative securities.

In a situation where there is an unexpected change in the interest-rate structure or when interest rate forecasting becomes a difficult task, hedging proves to be an effective method to manage the interest rate risk. However, there are certain prerequisites for the effective utilization of the hedging instruments and their relating operations. First and foremost is the existence of a market that is deep and highly liquid. This again requires a proper benchmark for the interest rates and also an active floating rate market. In addition to this, a proper understanding of the hedging mechanism is a must for the effective usage of the derivative instruments, lest it may lead to an overall increase in the risk.

Sensitivity Analysis

The sensitivity of an asset/liability can be assessed by the quantum of increase/decrease in the value of the assets/liabilities of varying maturities due to the interest rate fluctuations. Based on the sensitivity, all the assets/liabilities are regrouped. The sensitivity model then suggests the assessment of the gap between the assets and liabilities having a similar sensitivity index to the interest rate fluctuations. Further action will be taken to manage the gap so as to restrict the interest-rate risk.

Simulation and Game Theory

Given the expected changes in the short-term and the long-term operative environment, Game Theory simulates and forecasts the future trends. Using this concept, the expected risks and rewards of the different asset and liability classes are given along with the risk sensitivity and the gap between the short, medium and long-term assets and liabilities. Then, simulation is done by varying the interest rate structures to predict the short/medium/long-term implications of the same.

SUMMARY

- Though financial intermediation is becoming riskier, it however, does not pay to assume a neutral position in managing interest rate risk.
- A bank needs to maintain spreads for long-term viability.
- In this process it will be exposed to interest rate risk. The extent of interest rate risk/exposure, a bank should assume, depends upon how risk savvy/ averse it is.

<u>Chapter V</u> Managing Foreign Exchange Risk

After reading this chapter, you will be conversant with:

- Nature and Magnitude of Exchange Risk
- Tools and Techniques for Managing Forex Risk
- Managing the Currency Risk
- Futures, Options and Swaps

Managing Foreign Exchange Risk

A financial institution is exposed to foreign exchange risk when it is involved in multi-currency operations. This risk arises mainly due to the fluctuations in the currency rates and relates to the sensitivity of the value of the financial institutions' assets/liabilities denominated in any foreign currency, to unanticipated changes in exchange rates. The value of domestic currency depreciates when there is any appreciation of the foreign currency of the country with which the company is dealing. This leads to increase in the value of the firm's assets and liabilities denominated in the foreign currency and vice versa. Operating income of such financial institution gets affected due to fluctuations in the currency values. The value of the currency is influenced by various factors that include demand and supply, balance of payments, trade deficit, government borrowing, export viability, inflation, interest rates and political stability. All these factors further result in large variations in the profitability of the firms in the global market, which enhance the volatility in the world markets. Though the fluctuations in the currency rates can be anticipated to a certain extent, the uncertainty remains. For a financial institution, which operates in multiple currencies, the uncertainties and the associated risks will be more.

Foreign Exchange Risk maybe defined as the risk that a bank may suffer from losses that are a result of adverse exchange rate movements during a period in which it has an open position, either spot or forward, or a combination of the two, in an individual foreign currency. Risk that arises from the maturity mismatching of foreign currency positions is one example, which indicates that banks are exposed to interest rate risk. Even in cases, where, spot and forward positions in individual currencies are balanced, the maturity pattern of forward transactions may produce mismatches. As a result, banks may suffer losses due to changes in premia/discounts of the currencies concerned. Banks also face the risk of default of the counterparties or settlement risk, in the forex business. Banks may have to undertake fresh transactions in the cash/spot market for replacing the failed transactions while such type of risk crystallization does not cause principal loss. Thus, banks may incur replacement cost, which depends upon the currency rate movements. Banks also face another risk, arising out of time lags in settlement of one currency in one centre and the settlement of another currency in another timezone called time-zone risk or Herstatt risk.

The forex transactions with counterparties from another country also trigger sovereign or country risk.

The three important issues that need to be addressed in this regard are:

- Nature and magnitude of exchange risk
- Tools and techniques of managing forex risk
- Categorization of foreign exchange risk.

Let us now discuss each of these in brief.

NATURE AND MAGNITUDE OF EXCHANGE RISK

The risk involved in running open foreign exchange positions has been increasing in recent years by the pronounced volatility in forex rates, thereby adding a new angle to the risk profile of banks' balance sheets. The first aspect of managing foreign exchange risk is to accept that such risk does exist and that it must be

managed to avoid contrary financial consequences. Banks feel that financial forecasting is outside their field of expertise. They also find it difficult to measure currency exposure precisely. Many banks, therefore, refrain from active management of their foreign exchange exposure. However, not identifying a risk would not make it go away. Nor is the failure to measure risk any excuse for not handling it. Having recognized this fact, the nature and degree of such risk must now be identified. The basic difficulty in measuring exposure arises as the available accounting information that provides the most reliable base to evaluate exposure (accounting or translation exposure) does not capture the actual risk a bank faces because it depends on its future cash flows and their related risk profiles (economic exposure). Also there is the distinction between the currency that determines the size of the cash flows and the currency in which cash flows are denounced. For instance, a borrower selling jewellery in Europe may keep its records in Rupees, invoice in Euros, and collect Euro cash flow, only to find that its revenue stream behaves as if it were in US dollars. This occurs because Europrices for the exports might adjust to reflect world market prices which could be determined in US dollars.

The element of time is another dimension of exchange risk. In the very short run, virtually after an unexpected exchange rate change all-local currency prices for goods and services (although not necessarily for financial assets) remain unchanged. However, over a longer period of time, costs and prices respond to price changes. It is therefore necessary to determine the time frame within which the bank can react to (unexpected) rate changes. Banks, being a financial entity, it is relatively easier for them to guage the nature as well as the measure of forex risk simply because all financial assets/liabilities are denominated in a single currency. A bank's future cash flows are more predictable than those of a non-financial firm. Its net exposure, or position, completely captures the measure of its exposure to forex risk.

In order to handle forex risk, some forex market relationships need to be implied well. The first and most important of these is the covered interest parity relationship. The interest differential between any two currencies will be equal to the forward premium/discount for either of the currency incase of free markets (Unrestricted capital mobility). This relationship must hold under the assumptions or else arbitrage breaks will arise to restore the relationship. However, in the case of Rupee, since it is not totally convertible, this relationship does not hold exactly. Although interest rate differential, are the driving factor for the dollar premium against the Rupee, it is also a factor of forward demand/supply factors. This brings in typical barriers to forward hedging which must be taken into consideration.

From the above it can easily be determined that a currency with a lower interest rate will be at a premium to a currency with a higher interest rate. The other relationships in the forex market are not as deterministic as the covered interest parity, but needs to be recognized to manage forex exposure because they are the theoretical tools used for predicting exchange rate movements, essential to any hedging strategy particularly to economic risk as opposed to accounting risk. The most important of these is the Purchasing Power Parity relationship, which says exchange rate changes are determined by inflation differentials. The Uncovered Interest Parity theory says that the forward exchange rate is the best and objective indicator of future spot rates under risk neutrality. These relationships have to be clearly understood for any meaningful forex risk management process.

Managing Foreign Exchange Risk

For a bank a major decision on foreign exchange management is to fix its open foreign exchange position limits. Although this is typically a management decision, it could also be subject to regulatory capital and could also be required to be in tune with the regulatory environment that prevails.

The Daylight limit and the Overnight limit are the two aspects of open position limits. The daylight limit could naturally be considerably higher for two reasons, (a) When the market is open and the bank is actively present in the market it is easier to manage exchange risk and (b) The bank needs a higher limit to accommodate client flows during business hours. Overnight position, being subject to more uncertainty and therefore being more risky should be much lower. Having decided on the overall open position limits, the next step is to allocate these limits among different operating centers of the bank (in the case of banks which hold positions at multiple centres). Within a center, there could be a further allocation among different dealers. It must however be ensured that the bank has a system to monitor the overall open position limit for the bank on a real time basis.

TOOLS AND TECHNIQUES FOR MANAGING FOREX RISK

There are various tools, often substitutes, to hedge foreign exchange risk like over the counter forwards, futures, money market instruments, options and the like. Most currency management instruments enable the bank to take a long or a short position to hedge an opposite short or long position. In equilibrium and in an efficient market the cost of all will be the same, according to the fundamental relationships. The tools differ to the extent that they hedge different risks. In particular, symmetric hedging tools like futures cannot easily hedge contingent cash flows where risk is non-linear: options may be better suited to the latter. Foreign exchange forward contracts are the most common means of hedging transactions in foreign currencies. However since they require future performance, and if one party is unable to perform on the contract, the hedge disappears, bringing in replacement risk which could be high. This default risk also means that many banks may not have access to the forward market to adequately hedge their exchange exposure. For such situations, futures may be more suitable, where available, since they are exchange traded and effectively minimise default risk. However, futures are standardised and therefore may not be as versatile in terms of quantity and tenor as over the counter forward contracts. This in turn gives rise to assumption of basis risk.

Money market borrowing to invest in interest-bearing assets to offset a foreign currency payment – also serves the same purpose as forward contracts. This follows from the covered interest parity principle. Since the carrying cost of a position is the same in both, the forex or the money market hedging can also be done in either market. For instance, let us say a bank has a short forward dollar position. It can of course hedge the position by buying forward dollars. Alternatively it can borrow rupees now, buy dollar with the proceeds, and place the dollars in a forward deposit to meet the short dollar position on maturity. The rupees received on the sale on maturity are used to pay off the rupee borrowing. The cost of this money market hedge is the difference between the rupee interest rate paid and the US dollar interest rate earned. According to the interest rate parity theorem, the interest differential equals the forward exchange premium, the percentage by which the forward rate differs from the spot exchange rate. So the cost of the money market hedge should be the same as the forward or futures market hedge.

Currency options are another tool for managing forex risk. A foreign exchange option is a contract for future delivery of a currency in exchange for another, where the holder of the option has the right to buy (or sell) the currency at an agreed price, the strike or exercise price, but is not required to do so. The right to buy is a call; the right to sell, a put. For such a right he pays a price called the option premium. The option seller receives the premium and is obliged to make (or take) delivery at the agreed-upon price if the buyer exercises his option. In some options, the instrument being delivered is the currency itself; in others, a futures contract on the currency. American options permit the holder to exercise at any time before the expiration date and European options, only on the expiration date. Futures and forwards are contracts in which two parties oblige themselves to exchange something in the future. They are thus useful to hedge or convert known currency or interest rate exposures. An option, in contrast, gives one party the right but not the obligation to buy or sell an asset under specified conditions while the other party assumes an obligation to sell or buy that asset if that option is exercised. Options being non-linear instruments are more difficult to price and therefore their risk profiles need to be well understood before they can be used. For example it needs to be understood that the value of a currency changes not just when exchange rate changes (the event for which the bank usually hedges using forwards/futures) but also if the underlying volatility of the currency pair changes, a risk which banks are not directly concerned with while hedging.

Categorization of Foreign Exchange Risk

Foreign exchange risk can be classified into three categories based on the nature of the exposure. Listed below are the three kinds of forex exposures:

- Transaction exposure
- Translation exposure
- Operating exposure.

These three foreign exchange exposures and the risks faced by the financial institutions due to the same are discussed below.

TRANSACTION EXPOSURE

The transaction exposure measures the risk involved due to the change in the foreign exchange rate between the time the transaction is executed and the time it is settled. For instance, ALGO Ltd., an Indian company, enters into a purchase transaction with a US based company and the transaction is invoiced in US\$. The terms of contract provide for payment after 2 months. During the period of the transaction if the Indian Rupee depreciates, then it will have to pay more rupees to remit the US\$ than it actually had to at the time of entering into the transaction. Thus, transaction exposure leads to a risk of loss when there is a conversion of one currency into another. A gain is also possible if the movement in the currency rate is favorable.

For a financial institution, this type of a risk does not normally occur in its routine business operations. Manufacturing/trading units are more exposed to such risk. If ALGO Ltd., buys US\$ from a bank either on the spot or in the forward market, then the bank will become short having sold the US\$. However, the Bank takes up a long position immediately to square up the transaction so as to eliminate the exposure. Thus banks, in general, hold a square or near square positions at the end of each day by going long (short) corresponding to every transaction with the customer (Merchant Transaction) which is short (long). Hence, the transaction exposure to the banks mostly remains an intra-day exposure. The bank helps the customers to hedge their exposure while ensuring that it also hedges its exposure.

TRANSLATION EXPOSURE

Differentiating itself from the transaction exposure is the translation exposure which refers to the risk arising on account of changes in exchange rates at the time of finalizing/consolidating the financial statements which has assets/liabilities denominated in foreign currencies. When a company has to finalize/consolidate its accounts, it has to convert its foreign currency denominated assets/liabilities at the applicable exchange rates as against the rates at which they are initially recorded. The rates at which the existing liabilities/assets are to be converted are governed by the guidelines issued by Foreign Exchange Dealers Association of India (FEDAI) and the Institute of Chartered Accountants of India (ICAI). The financial institution is directly affected by this translation risk.

OPERATING EXPOSURE

Operating exposure arises because of the impact of the change in currency rates on the profits of a corporate. This can arise even when a corporate does not deal in foreign currency. For example, the recent depreciation of South-East Asian currencies has had its impact on the Indian exporters even though the Indian exporters do not deal with these currencies. It happens essentially due to the increased competitiveness of the exports of South-East Asian countries. However, such an exposure is not significant for the financial institution.

MANAGING THE CURRENCY RISK

For measuring and managing the currency risk and to insulate against the exchange rate fluctuations, sophisticated risk management strategies are adopted. The basic strategy for most of the financial institutions is to hedge by the effective use of derivatives. The hedging mechanism mostly includes the following:

- Forward Contracts
- Currency Futures
- Currency Options
- Currency Swaps.

With these various hedging mechanisms, foreign exchange risk management will, however, become profitable. Nevertheless, a lot depends on the depth of the markets, the level of understanding of the hedging mechanism and the risks and costs associated with the various derivative instruments. And with more and more nations entering the global scenario, the effort required by the financial institution to identify, measure and adopt a suitable hedging mechanism to manage the foreign exchange risk needs no emphasis.

Forward Contracts

In order to hedge its transaction exposure, a company having a long position in a currency (having a receivable) will sell the currency forward, i.e., go short in the forward market, and a company having a short position in a currency (having a payable) will buy the currency forward, i.e., go long in the forward market.

The idea behind buying or selling a currency in the forward market is to lock the rate at which the foreign currency transaction takes place, and hence, the costs or profits. For example, if an Indian firm is importing computers from the USA and needs to pay \$1,00,000 after 3 months to the exporter, it can book a 3-month forward contract to buy \$1,00,000. If the 3-month forward rate is Rs.42.50/\$, the cost to the Indian firm will be locked at Rs.42,50,000. Whatever be the actual spot price at the end of three months, the firm needs to pay only the forward rate. Thus, a forward contract eliminates transaction exposure completely.

Most of the times, when the transaction exposure is hedged, the translation exposure gets automatically hedged. In the above example, the translation exposure gets automatically hedged as any loss/gain on the outstanding payable gets set-off by the gain/loss on the forward contract. But there may be situations where the translation exposure may need to be hedged, either because the underlying transaction exposure has not been hedged or because the translation exposure arises due to the company holding some long-term asset or liability. In such situations also, forward contracts may be used to hedge the exposure. The firm would need to determine its net exposure in a currency and then book an opposite forward contract, thus nullifying its exposure. For example, if a firm has a net positive exposure of \$1,00,000, it will sell \$1,00,000 forward so that any loss by exchange rate movements on account of the main exposure will be canceled off by the gain on the forward contract, and vice versa. However, the gain/loss on the underlying exposure will be notional while the loss/gain on the forward contract will be real and involve cash outlay.

The cost of a forward hedge can be measured by the opportunity cost, which depends on the expected spot rate at which the currency needs to be bought or sold in the absence of the forward contract. Hence, the cost of a forward hedge is measured as the difference between the forward rate and the expected spot rate for the relevant maturity. In an efficient market, as mentioned earlier, the forward rate is an unbiased predictor of the future spot rate. The process equating these two requires the speculators to be risk-neutral. Hence, when the markets are efficient and the speculators are risk-averse, the cost of hedging through the forward market will be nil.

Currency Futures

In 1972, Chicago Mercantile Exchange (CME) was the first exchange to introduce the financial futures contracts. All developed countries imported a plethora of foreign goods, which in turn created a demand for foreign currencies. Thus, huge volumes of international transactions led to the development of foreign currency markets, which in turn created the necessity for foreign currency futures.

The foreign currency futures contracts need to specify a trading unit (such as British Pound, Euro, a Swiss Franc, etc.) quotations (such as US\$ per pound, US\$ per Franc, etc.), minimum price change contract months, US\$ value of currency as on day and delivery date. In the early 1970s, contracts were traded on British pound, Canadian Dollar, Japanese Yen, Swiss Franc and German Mark. Currency contracts on French Francs, Dutch Guilders and Mexican Peso were not successful, thus, no longer traded. Presently, Euro, Japanese Yen, Swiss Franc, British Pound, Canadian Dollar, and Australian Dollar are traded on CME.

Currency Futures can thus be defined as "a binding obligation to buy or sell a particular currency against another at a designated rate of exchange on a specified future date".

The contract size specifications for the seven currencies traded in the CME are as follows:

- British Pounds 62,500 as minimum trading quantity.
- Canadian Dollars 100,000 as minimum trading quantity.
- Japanese Yens 1,25,00,000 as minimum trading quantity.
- Swiss Francs 1,25,000 as minimum trading quantity.
- Australian Dollars 1,00,000 as minimum trading quantity.
- Deutsche Mark.
- New Zealand Dollar.

Managing Foreign Exchange Risk

Table 1						
	CME	SIMEX	PBT	SFE	TIFFE	NZFOE
Deutsche Mark	*	*	*			
Canadian Dollar	*		*	—		
Swiss Franc	*		*	—		
British Pound	*	*	*			
Japanese Yen	*	*	*	—	*	
Australian Dollar	*		*	*		_
New Zealand Dollar		_				*

Table 1 depicts the important futures exchanges and the currencies traded on these exchanges:

• CME : Chicago Mercantile Exchange

- SIMEX : Singapore International Financial Futures Exchange
- PBT : Philadelphia Board of Trade
- SFE : Sidney Futures Exchange
- TIFFE : Tokyo International Financial Futures Exchange
- NZFOE : New Zealand Futures and Option Exchange.

Currency Options

The largest portion of the currency option market is the interbank market. Some of the stock exchanges list currency options also. For instance, the Philadelphia Stock Exchange lists options on foreign currency. A currency call is similar to a call on a stock that gives the holder the right to buy a fixed amount of foreign currency at a fixed exchange rate on or before the option's expiration date.

A currency put gives the holder the right to sell a fixed amount of foreign currency at a fixed exchange rate on or before the options expiration date.

Box 1: Currency Options in India

Trading in rupee option started from 7th July 2003, after the RBI allowed options in rupee. On the first day of the trading the transaction volume was \$200-\$250. Options help corporates to hedge their forex risks. An option is a derivative contract that gives one the right, but not the obligation, to buy or sell something on a stated date at a stated price in the future. In forward contracts, there is an obligation to buy or to sell, depending on the commitment made.

Leading foreign banks such as Standard Chartered, HSBC, and ABN Amro were among the first to report major transactions. Indian banks such as SBI, IDBI, ICICI Bank and IndusInd were also active in the market.

Motives behind Introducing Currency Options and Cross Currency Options

All Indian clients are permitted to purchase cross currency options to hedge their trade exposures. Authorized forex dealers in India who offer these products are required to cover them back to back in international markets and not carry the risk in their own books. With increased awareness of the balance sheet mismatches by the banks and financial institutions and the associated risks, a need for appropriate risk management product is felt and the required steps taken in that direction. As this awareness increases further, there will be a continuous demand for more innovative products and sophisticated solutions to optimize the financing and treasury management functions. A major amendment of Securities Contracts Regulation Act (SCRA) would be required to legally permit OTC traded derivatives. This is because most non-standardized derivatives world over are OTC traded. Another step that has to be taken for a more rapid and orderly development of derivatives market is establishment of internationally accepted guidelines and their recognition by tax authorities in the Indian scenario.

Rationale Behind FC-INR Currency Options

They allow hedging currency exposures to protect the downside by way of premium paid upfront. Currency options would help the Indian industry and businesses to compete better in international markets by hedging currency risk.

The pay-off profile of the currency options helps in hedging different types of exposures. For instance, if an Indian company is buying a good/service from abroad, where the bid quote is in foreign currency but the local costs of production are in rupees, then the company faces a risk till the buying contract is allotted. When forwards or currency swaps are used to cover this risk, or if the company is not allotted the contract, then, these derivatives would create reverse positions. This reverse position may result in cash loss. But the use of an option contract would limit the liability to the extent of the option premium paid.

The nature of the instrument allows it to be used as a hedge against uncertainty of the cash flows.

It helps in attracting further forex investment due to the availability of another mechanism for hedging forex risk.

Keeping in mind the requirement of Indian markets, the following product structure is recommended at the introduction stage.

Options can be introduced as Over-the-Counter contracts.

Specifications of the contract would include,

- Currency pair FC-INR where FC is the foreign currency as desired by the client,
- European exercise,
- Notional amount can be customized to meet counterparties' requirements and no minimum amount is suggested,
- Premium payable on spot basis,
- Settlement can be either through delivery on spot basis or through net cash in rupees on spot basis based on the FC-INR spot rate on maturity date,
- Strike price is also customized as per counterparties' needs,
- The maturity of the options is tailored to the requirements of the transacting parties. Some of the typical maturities observed in international markets are 1 week, 2 weeks, 1 Month, 3 months, 6 months, etc.

Market Participants

In the options market authorized dealers may be allowed by the RBI to enter into FC-INR option contracts with their clients. Any person residing in India would be allowed to use foreign currency-rupee options to hedge his exposure arising out of trade, foreign currency liabilities, etc. Foreign institutional investors can also hedge their exposures in India provided that the value of the hedge does not exceed 15% of the market value to the equity at initiation of the hedge.

Permitted Hedges with FC-INR Options

Contingent exposures arise only when a contract involving foreign currency payment of a receivable is agreed between the parties involved in a transaction.

Derived foreign exchange exposures are generated out of swaps and other permitted transactions. For example, if a country has a foreign currency exposure of its swap agreement with another party for its rupee liability, then it may be allowed to book rupee options on interest payment due on the foreign currency.

Only one hedge transaction may be booked against a particular exposure for a given time period. At maturity, the change of hedge instrument is left at the client's discretion. For example, if an exporter has some USD receivables after 6 months then he can sell a forward for 3 months and at maturity net settle the

contract and buy a put option for 3 months. As the options and forwards essentially hedge the same risk, the clients can exercise their choice at the maturity of the original contract.

All the authorized dealers are allowed to offer all FX derivative products with approval required from RBI exchange control department for offering cross currency options on covered basis. Banks may use this product for the purpose of hedging trading books and balance sheet exposures or offering to their clients on covered basis.

Interbank participation will be allowed in option contracts due to following reasons:

- This would help Authorized Dealers (ADs) in foreign exchange to effectively manage their options positions within the limits prescribed.
- Options being non-linear products, the risks of open positions can be completely hedged only by entering into other option contracts.
- It will help in providing liquidity and narrow bid-offer quotes.
- Current regulatory framework for cross currency options allows residents to use various cost reduction strategies provided there is no net inflow of premium to the client. Since the risks arising from a naked option are almost similar to that from a zero cost structure there is a need for allowing clients to write naked options and be net receivers of premium in case of structures.

The current rationale regarding cancellations and rebooking for forward contracts may be continued with the FC/INR options market in India. Hedging options positions tend to be dynamic in nature and hedges are required to be rebalanced frequently. Static-one time hedging of an option position is possible only by entering into an offsetting option transaction.

Pricing and Quotation Systems

The premium of FC-INR options is dependent upon the spot rate, interest rates in both currencies and the estimate of future volatility in spot rate. The international practice is to quote the premium as percentage of the national amount and can be settled in any of the currencies involved.

Standard Black-Scholes model is used for computing option premiums required for mentioning the quotes. The volatility that results in required premium is called implied volatility which is also quoted in the market. Authorized dealers could quote the option premium in rupees or as a percentage of the rupee notional amount. The premium could be paid in rupee terms.

The authorized dealers would be required to report to RBI on a weekly basis information regarding option transactions undertaken and the option portfolio.

Authorized dealers are also required to report the change in delta expected for the portfolio if spot changes by a certain value. (Say 0.5%, 1%, etc.)

Source: ICFAI Research Center.

Currency Swaps

A currency swap is a contract involving exchange of interest payments on a loan in one currency for fixed or floating interest payments on equivalent loan in a different currency. Currency swaps may or may not involve initial exchange of principal. A plain vanilla currency swap is a fixed-fixed currency swap in which each party pays a fixed payment on the loan taken by them.

Along with interest rate swaps, the currency swaps market rose from the earlier parallel and back-to-back loan structures which were developed and designed in the United Kingdom as a means of circumventing foreign exchange controls and to prevent an outflow of British capital. In the 1970s, the British government imposed taxes on foreign exchange transactions that involved its currency. Due to this, the parallel loan became a widely accepted transaction by which these taxes could be avoided. The back-to-back loan is similar to the parallel loan with small modifications. In 1979, these taxes on foreign exchange transactions were removed because of which British firms did not need to take back-to-back loans. However, during the 1980s, banks modified those loans and launched currency swaps. They achieved similar economic purposes like parallel and back-to-back loans. Currency swaps effectively decreased the use of these loans due to the following advantages:

- In currency swaps, if one party defaults the other party can terminate the contract and still claim the damages.
- As the currency swap is not a loan, it does not appear as a liability on the contracted party's balance sheet unlike parallel loans.
- Currency swaps have high liquidity. As such banks themselves are ready to take risk in a swap transaction.

In the back-to-back and parallel loans (which are still in practice) the documentation is cumbersome and counterparties have to find others with mirror currency requirement. Changes in interest rates and foreign exchange rates during the life of the structures also cause difficulties. Currency swaps do not involve foreign currency loans like their predecessors. Instead, in a typical currency swap, one party agrees to make periodic payments, based on either fixed or floating interest rates, to a counterparty that in turn makes periodic payments to the other in a different currency. The payments are based on principal amounts which are fixed at the initiation of the swap. Unlike interest swaps, where no exchange of principal takes place, in a currency swap the principal amount is generally exchanged at the beginning of the transaction and re-exchanged upon maturity.

The following flow chart shows the mechanics of currency swaps.



BASIC STEPS IN CURRENCY SWAPS

Currency swaps involve three steps, although the first may be notional.

The steps are:

- Step 1: Initial exchange of principal.
- *Step 2*: Exchange of interest rate.
- *Step 3*: Re-exchange the principal at the end of the contract.

The principal amount is agreed at the outset in one currency along with the exchange rate which will be used to determine the equivalent amount in the other currency. The principal amounts may be physically exchanged on the commencement date of the swap or may be notionally exchanged as with an interest rate swap. The exchange rate will usually be the spot, but an off-market rate may also be used, which will, in turn, alter the subsequent interest rate flows.

A notional swap of principal has the same outcome as a physical exchange. Funds raised in the spot market instead of being exchanged as part of the swap arrangements are simply exchanged into the desired currency in the foreign exchange market.

Interest rate obligations have been swapped, resulting in interest payments and receipts on agreed dates based upon the swapped principal amounts. Interest will be either fixed or floating as appropriate to the type of swap and each counterparty's obligations. Naturally the two interest rate flows will be in different currencies. At maturity the principal will be re-exchanged.

Assume that you are the treasurer of a German firm and in need of dollar funds but you are not in a position to borrow dollars now. There is a US firm X which needs Euro now but it cannot borrow Euro due to some financial constraints. You can exchange the funds in the currency you have for the desired currency with firm X. That is nothing but a currency swap. The motivation behind this currency swap is the actual need for funds denominated in a different currency. A typical currency swap involves three steps. They are:

- Exchange of principal amount,
- Periodic interest payments to each other on the principal amount borrowed,
- Re-exchange of the principal amount borrowed.

A currency swap need not involve an initial exchange of the principal if the parties involved are concerned about only periodic requirements of different currencies. In such a situation the principal involved will be notional and only periodic interest payments will be exchanged between the two parties concerned. Similar to interest rate swaps, in cross currency interest rate swaps, the interest payments are netted. These payments are determined by the prevailing exchange rates on the payment date.

OTHER TYPES OF CURRENCY SWAPS

Fixed to Floating Currency Swaps (Non-amortizing)

As in a currency swap, the parties exchange the principal at the outset of the swap but one party pays a fixed rate of interest on the foreign currency it receives and the other party pays a floating rate of interest rate on the foreign currency it receives. It is a plain vanilla currency swap. At the swap's maturity, there is a re-exchange of principal amounts. Interest payments are periodically exchanged during the life of the transaction.

Fixed to Fixed Currency Swaps (Non-amortizing)

It is identical to the fixed for floating currency swap except that instead of a fixed and a floating rate of interest, both parties pay fixed rate of interest. This can be done by having a single agreement or two agreements for swapping.

Circus Swaps

Here two fixed-floating currency swaps are combined to form a fixed to fixed currency swap which is also called a circus swap. It can be created by combining a currency swap and an interest rate swap too, with floating rate or both having LIBOR based pricing.

PRICING OF SWAPS

Basics

Since swap is an exchange of two streams of cash flows it can be priced by determining the value of each stream of cash flows. The value of each stream of cash flows is the net present value of the cash flows in the stream. If the cash flows are in different currencies (as in currency swaps) the present values are converted in to a single currency at the prevailing exchange rate. The price of the swap is the difference between the values of the two cash flows.

Pricing of Swaps by Swap Banks

Swap banks price each swap based on the following six factors:

- How the swap has been designed.
- How long the swap will take till maturity.
- How many parties match the swap.
- How creditworthy are the counterparties to the swap.
- How could the swap be affected by regulatory implications of the countries to which both counterparties belong.
- How tight is the credit policy in the countries from where the swap counterparties hail.

SWAP RISKS

While the earnings of the swap bank are from the bid-ask spread of swaps and the fees charged (upfront fees), it has to entail the following risks, which are inherent to the swap business and are mostly inter-related:

Interest Rate Risks

Interest rate risks arise mostly on fixed rate legs of swaps. While the floating rate interest can be periodically adjusted to the prevailing interest rates, the fixed rate remains constant. A change in the level of interest rates in the market not accompanied by a change in the yield of debt instruments of the same time period as the interest rates, will entail interest rate losses to the bank. Unless the swap bank is fully hedged, losses will be incurred.

Currency Exchange Risks

Currency exchange risks occur when there is an exchange rate commitment given to one party and there is a steep change in the exchange rate between the currencies in the swap. If the swap bank is not able to match the counterparty well in time, it will incur losses due to the exchange rate difference.

Market Risks

Market risks occur when there is difficulty in finding a counterparty to a swap. Usually, longer maturity swaps have less takers and vice versa. Lower the number of takers, higher the risks of losses.

Credit Risks

Credit risks are those risks which the swap bank has to bear in case the counterparty to a swap defaults on payment due to bankruptcy or any other default, legal or otherwise. The bank continues to be obliged to pay the other party of the swap, irrespective of whether the former party defaulted or not. Market risks and credit risks together amount to default risks of the bank.

Mismatch Risks

Mismatch risks take place when the swap bank comes across mismatches in the requirements of both counterparties to the swap. Usually, banks have a pool of swaps and have no difficulty in finding matches, but if no party is found, it leads to the risk of mismatch of losses. This risk is further aggravated in case one of the parties defaults.

Basis Risks

Basis risks occur mostly in floating-to-floating rate swaps, when both the sides are pegged to two different indices and both the indices are fluctuating and there is no proper correlation between the two.

Spread Risks

Spread risks happen when the spread changes over the time period the parties are matched. The spread risk is not the same as interest rate risk, as spreads may change as a result of change in basis points, while the interest rate may still remain constant.

Settlement Risks

Settlement risks occur when the payments of currency swaps are made at different times of the day mainly because of different settlement hours in capital markets of two countries involved in the currency swap. If a limit on the size of the settlement is placed for each day, this risk is minimized.

Sovereign Risks

Sovereign risks occur if a country changes its rules regarding currency deals. It mostly happens in the underdeveloped or developing countries which tend to have more political instability than the developed world.

Managing Swap Risks

If a swap bank could exactly match all its portfolio of swaps, it would be an optimal situation, risk less and profitable, without the bank having to bother much about managing risks and maintaining a team of risk management experts on its payroll.

But as optimization is not always the case in real life situations, a bank has to minimize its risks as it cannot totally eliminate them.

To some extent, several risks are off-set through natural hedging while the others must be measured and managed.

Some risks can be hedged through options, futures and other risk management tools.

Unsystematic risks (like credit risks) can be reduced by diversification and systematic risks (like sovereign risks) can be minimized by restricting or limiting one's entry in to new and unstable countries.

Treasury Operations

The primary treasury operation of a bank is to cater to customer needs, both in the spot as well as forward market. This lands the bank with net foreign exchange positions which it needs to manage on a real time basis. If the bank needs to sell dollars forward to an importer, the bank has a short dollar position. It can offset the position by buying matching forward dollars in the market in which case all risks apart from the profit element are covered for the bank. However, it may be easier for the bank to immediately cover the forex risk with a purchase of dollars in the spot market. Here again the exchange risk is fully covered except for the profit element. However the bank now has a swap position. This is called a gap. The bank has a gap risk which affects it if interest rates change affecting the forward premia for dollar. In the case of our domestic markets, in addition, premia could also change due to forward demand/supply factors. However, gap risks are easier to manage than exchange risks. So the bank can build up gaps, subject to the

management mandated gap limits, and offset swaps to reduce gap risks if it so desires periodically. The bank's treasury might also do transactions to take advantage of disequilibrium situations, subject to such transactions being permissible. For instance, if the forward premium for 6 months is say, 5% while the 6-month interest differential between Rupee and Dollar is say, 4%, the bank can receive in the forex market (buy spot, sell 6-month swap to earn 5% annualised for 6 months) and finance the transaction by borrowing in the money market (money market cost being 4% annualised for 6 months).

The bank can also do transactions to take advantage of expected interest rate changes. It can then use either the money market route (mismatched cash-flow maturities) or the forex market route (by running a gap risk). The bank of course also trades on currency movements with a view to make profits. Here the management must keep in place systems stop loss discipline, proper monitoring and evaluation of open positions etc.

Risk Control Systems

The management of the bank needs to lay out clear and unambiguous performance measurement criteria, accountability norms and financial limits in its treasury operations. It must specify in operational terms the goals of exchange risk management. It must also clearly recognize the risks of trading arising from open positions, credit risks, and operations risks. The bank must also keep in place a system to independently evaluate through marking to market the net positions taken. Marking to market should ideally be based on objective market prices provided by an external agency. All position limits should be made explicit and expressed in simple terms for easy control.

SUMMARY

- When the operations are in multi currencies, the organizations are exposed to foreign exchange risk. The main reason for this is the change in the exchange rate of different currencies. In the context of a bank, the Foreign Exchange Risk may be defined as the risk that arises when a bank may suffer losses as a result of adverse exchange rate movements during a period in which it has an open position, either spot or forward, or a combination of the two, in an individual foreign currency. For a bank, therefore, the first major decision on forex risk management is for the management to fix its open foreign exchange position limits.
- The foreign exchange risk is mainly classified into three categories based on the nature of the exposure. This includes, transaction exposure, translation exposure and operating exposure. The basic strategy adopted by most of the banks and financial institutions is to hedge by the effective use of derivatives. The hedging mechanism is mostly operated with the derivative contracts like, Forward contracts, Futures, Options and swaps. For an effective risk control system, the management of the banks and financial institutions need to layout clear and unambiguous performance measurement criteria, accountability norms and financial limits in their treasury operations.

Appendix

RBI/2005-06/289 A.P.(DIR Series) Circular No. 24

January 25, 2006

To All Banks Authorized to Deal in Foreign Exchange Madam/Sir,

Foreign Investment in Tier I and Tier II Instruments Issued by Banks in India

Attention of Authorized Dealer (AD) banks is invited to the Foreign Exchange Management (Transfer or Issue of Security by a Person Resident outside India) Regulations, 2000 notified by the Reserve Bank of India vide Notification No.20 dated 3rd May 2000, as amended from time to time. Regulation 5 of the said Notification read with Schedule 2, 3 and 5 specifies the capital market instruments which can be subscribed to by Foreign Institutional Investors (FIIs) registered with Securities and Exchange Board of India (SEBI) and by Non-Resident Indians (NRIs).

- 2. With a view to permit banks in India to augment their capital through issue of Perpetual Debt instruments eligible for inclusion as Tier I capital and Debt capital instruments as upper Tier II capital, it has been decided to permit the following category of foreign investors to subscribe to these instruments:
 - i. Foreign Institutional Investors (FIIs) registered with SEBI, and
 - ii. Non-Resident Indians (NRIs).
- 3. The foreign investments in these instruments will be subject to the following conditions.
 - a. The investment by all FIIs in Perpetual Debt instruments (Tier I) should not exceed an aggregate ceiling of 49 percent of each issue, and investment by individual FII should not exceed the limit of 10 percent of each issue.
 - b. The investments by all NRIs in Perpetual Debt instruments (Tier I) should not exceed an aggregate ceiling of 24 percent of each issue and investments by a single NRI should not exceed 5 percent of the issue.
 - c. The investment by FIIs in Debt capital instruments (Tier II) shall be within the limits stipulated by SEBI for FII investment in corporate debt.
 - d. Investment by NRIs in Debt capital instruments (Tier II) shall be in accordance with the extant policy for investment by NRIs in other debt instruments.
- 4. The issuing banks will be required to ensure compliance with the conditions stipulated in paragraph 3 above at the time of issue.
- 5. The issue-wise details of amount raised as Perpetual Debt Instruments qualifying for Tier I capital by the bank from FIIs/NRIs are required to be reported within 30 days of the issue in the annexed proforma to the Chief General Manager, Reserve Bank of India, Foreign Exchange Department, Foreign Investment Division, Central Office, Mumbai 400 001. The details of the secondary market sales/purchases by FIIs and the NRIs in these instruments on the floor of the stock exchange shall be reported by the custodians and designated banks, respectively to the Reserve Bank of India through the soft copy of the LEC Returns, on a daily basis, as prescribed in Schedule 2 and 3 of the Notification under reference.
- 6. The banks issuing Perpetual Debt instruments and Debt capital instruments shall also comply with the guidelines notified by the Department of Banking Operations and Development (DBOD), Reserve Bank of India, from time to time.

- 7. Necessary amendments to the Foreign Exchange Management (Transfer or Issue of Security by a Person Resident outside India) Regulations are being issued separately.
- 8. Authorized Dealer banks may bring the contents of this circular to the notice of their constituents and customers concerned.
- 9. The directions contained in this circular have been issued under sections 10(4) and 11(1) of the Foreign Exchange Management Act, 1999 (42 of 1999) and is without prejudice to permissions/approvals, if any, required under any other law.

Yours faithfully,

Vinay Baijal Chief General Manager

Annexure

Details of Investments by FIIs and NRIs in Perpetual Debt Instruments Qualifying as Tier-I Capital

- a. Name of the bank:
- b. Total issue size/

amount raised (in Rupees):

c. Date of issue:

FIIs			NRIs		
No. of	Amount raised		No. of	Amount raised	
1115	in Rupees	as a percentage of the total issue size	INKIS	in Rupees	as a percentage of the total issue size

It is certified that

- i. the aggregate investment by all FIIs does not exceed 49 percent of the issue size and investment by no individual FII exceeds 10 percent of the issue size.
- ii. It is certified that the aggregate investment by all NRIs does not exceed 24 percent of the issue size and investment by no individual NRI exceeds 5 percent of the issue size.

Authorized Signatory

Date

Seal of the Bank

<u>Chapter VI</u> Managing Liquidity Risk

After reading this chapter, you will be conversant with:

- Liquidity Risk and the Need for Managing it in the Long/Short Run
- Fundamental Approach to Long Run Liquidity Risk Management
- Technical Approach to Short Run Liquidity Risk Management
- Factors Influencing Investment-Borrowing Decisions
The object of any banking institution policy is twofold – ensuring profitability and liquidity. Working towards this end, a bank generally maintains profitability/spreads by borrowing short (lower costs) and lending long (higher yields). Though this process of price matching can be done well within the risk/exposure levels set for rate fluctuations, it may, however, place the bank in a potentially illiquid position.

Efficient matching of prices to manage the interest rate risk does not suffice to meet the ALM objective. Price matching should be coupled with proper maturity matching. The interlinkage between the interest rate risk and the liquidity of the firm highlights the need for maturity matching. The underlying implication of this interlinkage is that rate fluctuations may lead to defaults affecting severely the asset-liability position. Further, in a highly volatile situation, it may lead to liquidity crisis forcing the closure of the bank.

Managing the prices of assets and liabilities is an essential part of ALM, so also is liquidity, which is represented by the quality and marketability of the assets and liabilities, and which exposes the firm to liquidity risk. Though the management of liquidity risk and interest rate risk go hand in hand, there is, however, a phenomenal difference in the approach adopted to tackle these risks. A bank generally aims to eliminate the liquidity risk while it only tries to manage the interest rate risk. This differential approach is primarily based on the fact that elimination of interest rate risk is not profitable, while elimination of liquidity risk does result in long-term sustenance. Before attempting to analyze the elimination of liquidity risk, it is essential to understand the concept of liquidity management.

The core activity of any bank is to attain profitability through fund management i.e., acquisition and deployment of financial resources. An intricate part of fund management is liquidity management. Liquidity management relates primarily to the dependability of cash flows, both inflows and outflows, and the ability of the bank to meet maturing liabilities and customer demands for cash within the basic pricing policy framework. Liquidity risk hence, originates from the potential inability of the bank to generate cash to cope with the decline in liabilities or increase in assets.

The factors which are associated with liquidity risk management are discussed as follows:

Maturity Ladder: Basically to maintain the over-riding policy for long-term survival, banks are required to conduct their operations in a prudent manner. This would require having a maturity ladder of their assets and liabilities, as well as netted off-balance sheet obligations. When this will be achieved, it would result in a positive net cash-flow on a day-to-day basis. However, when the net cash flow is negative, the shortfall should be capable of being met from normal sources of funding such as inter-bank borrowings, but with a very high degree of certainty.

Projected Cash Flow: The most precise and desirable method of ensuring adequate liquidity would be to actually forecast future net cash-flows from all sources and demands on liquidity for the future say, daily, weekly and monthly. By this way, future demands on liquidity may be anticipated and planned for in good time.

It may not be possible to implement this system in the near future by the Indian Public Sector Banks with multiple branches, but they should recognize this requirement and adopt it as a medium-term objective.

Core Deposits: For calculating the estimated net cash flow, banks should normally start with contractual maturity dates on deposits. However, through long historical experience, banks could arrive at a figure of "Core Deposits" and appropriate adjustments could be made to reflect more cash which in turn will lead to accurate flow projections.

Maturity Ladder Limits: It is possible to determine cash flow limits before forecasting. In this connection banks will have to establish limits on their maturity mismatches to reflect their individual circumstances. The factors such as location of the branch, access to money markets, existence of standby lines, access to RBI discount window and level of management at the location will be guiding factors. Bank managements should lay down prudential limits for this purpose.

Sources of Liquidity: Banks normally derive liquidity from the following sources listed in descending order of availability and reliability:

Share Capital, Long-term Loans, Domestic Deposits, Commercial Deposits, Corporate Deposits, NRI Deposits, Institutional Deposits, Deposits with RBI, Inter Bank Borrowings, Short-term instruments (C.D/C.P).

Appropriate Mix of Liquidity Sources: Based on the nature of the bank's business and its consequent demands on liquidity such as loan demand, depositors' repayment requirements and other operational demands, it should be prudent to have the appropriate mix of liquidity sources with regard to their availability as well as reliability. Whilst these characteristics may only be determined by subjective estimation, it should be gradually developed within the bank.

Further, it would be desirable to have widely diversified sources of liquidity without any undue concentration on one source either on customers, category of customers, markets, instruments or term and maturities. Whenever possible, the quality of liquidity sources in terms of their availability and reliability should be improved by reducing dependence on less reliable sources and it should move on to sources that are more reliable.

It is mainly the responsibility of the Head Office of the bank to raise share capital primarily for capital adequacy requirements. It has the additional advantage of providing funds on a long-term basis to the bank. To the extent that branches avail these capital funds from the Head Office either in the form of loan capital or share capital in the case of subsidiaries, they may consider these funds as of long-term nature for which regular and early repayment would not be required as in case of normal circumstances.

Long-term Loans: These loans are normally raised by the Head Office, usually for secondary tier II capital purposes. However, those branches that have access to long-term funds may consider this as an additional source of high quality liquidity if it is desirable and cost effective.

Domestic Deposits: Indian banks are fortunate to have significant domestic deposits with long-term stability at attractive costs. Therefore, Domestic Deposits are most desirable from the liquidity management perspective. As such it should be retail banking strategy to maintain, enhance and defend such deposits so long as funding is required for deployment in assets, keeping in mind its costs and benefits to the bank in general. Newly opened private sector banks should encourage such deposits with full cognizance of the costs and benefits.

Commercial Deposits: Commercial deposits or in other words deposits from traders and businessmen affords an opportunity for those banks who have cost-effective processing systems to garner these deposits at relatively low marginal costs without a large investment in branch networks and systems required to access retail deposits.

Corporate Deposits: These deposits are more stable than retail deposits because corporate customers are more price sensitive and respond more quickly to competitive pricing. Nevertheless, corporate deposits could also demonstrate considerable stability. While term deposits from corporates are usually less stable than retail term and savings deposits, credit balances on corporate current accounts have been found, through experience, to have long-term "core" characteristics. The same comments could apply to correspondent banking vostro accounts and to a lesser degree custodial services account balances.

Managing Liquidity Risk

NRI Deposits: Many banks in India have collected sizeable NRI Deposits, which are excellent source of stable liquidity. NRIs, as a class of depositors, are a desirable customer segment because deposits are substantial and service costs are minimal. These funds represent savings made by NRIs and therefore could be regarded as almost permanent.

Institutional Deposits: Normally, banks build long-term relationships with a large number of institutional depositors. These are mostly financial institutions and their deposits are as sensitive to price as inter-bank deposits. However, the long-standing relationship allows a greater degree of stability to their deposits as compared to inter-bank deposits. Most banks have segregated and formed institutional banking divisions at their branches to cater to this type of depositors.

Inter-bank Borrowings: Quite a large number of banks in India depend on call money market funds as well as on issuance of short-term money market instruments to fund their shortfall. When the dependence is for a large measure, the involvement of senior management is imperative.

Contingency Plans: Unlikely in the normal course, it is possible that despite the primary prudential liquidity measures, there will be temporary pressures on liquidity arising from unexpected developments either internally or externally. In such a situation, having a detailed contingency plan in place would be essential to manage the situation effectively.

A contingency plan should include the following:

- Asset sources: These normally include holdings of high quality liquid paper in the form of short maturity instruments of very good credit risk which may be readily disposed of to other market participants in the form of treasury bills, certificates of deposits, zero coupon bonds, central and state governments' securities maturing within one year. There are also some other assets which include instruments issued by the Reserve Bank of India or DFHI and provide funds against through their discount window at the time of emergency. While other good quality bank assets such as loans may provide liquidity either mainly through normal repayment, sale or securitization etc., however, for contingency planning purposes they should be ignored due to long delays involved in realization.
- Liability sources: In connection with contingency planning purposes, these sources are more readily accessible at short notice. Therefore, these assets should be carefully cultivated. For example, stand-by lines with other banks are desirable for banks with higher degree of dependence on money market funds. Wherever possible, there should be advised lines with unequivocal commitment to provide funding when required. If necessary, reciprocal lines may have to be established against funds lent in overseas centers.
- **Inter-group funding:** It is possible to pre-arrange contingency funding from banks in the same group such as State Bank group or Nationalized Bank group. Moreover, as a part of contingency planning, availability of swap facilities from RBI against foreign currency should be established in most unequivocal terms.

Compliance with Local Requirements: All banks are expected to comply fully with local regulatory requirements on liquidity management such as Statutory Liquidity Ratio (SLR) and Cash Reserve Ratio (CRR). It must be recognized that maintenance of CRR is a first charge on the resources and all other deployments must be effected only after it is secured. It would be prudent to lay down that the minimum cash balance on any day in the fortnight does not fall short of the average requirement per day say by more than ten percent.

Banks' Own Liquidity Guidelines: All banks are required to adopt the broad liquidity policy and based on the above guidelines, should formulate their own liquidity management guidelines specific to their needs. Banks Asset and Liability Committee constituted at Head Office should necessarily approve these guidelines from time to time.

Responsibility for Liquidity Management: Banks Asset and Liability Committee is responsible for the strategic management of Banks' Liquidity Crisis. The main task is to oversee and regularly evaluate the liquidity policies for long-term safety of the bank. Further, each branch of a bank is to be made responsible for its own liquidity management on a stand-alone basis and have in place an appropriate official designated as responsible for overseeing all aspects of liquidity management. Where there are arrangements for inter-branch funding, these must be formalized with the terms and conditions set out clearly.

Details of Asset Liability Management Policies

- i. Cap on inter-bank borrowing: Specially known as call borrowing. The money market movements are reflected in call money rates because over dependence on call money for funding purposes may result in liquidity crisis. It is necessary to track the expected changes in inflow and outflow. Moreover, by imposing a tolerance limit on borrowing or lending, it is possible to minimize the loss. The tolerance limits fixed could also be bank specific, keeping an overall ceiling as the outer limit.
- ii. Purchased fund vis-à-vis core assets: Purchased funds, i.e., call money borrowing, short-term refinance, etc., should not constitute a significant portion of liquid assets. It is necessary to specify a tolerance limit for that purpose so that outgo of fund because of purchased fund is controlled.
- iii. **Core deposit vis-à-vis core assets:** Outstanding in loan books and the statutory reserves constitute core assets. The ratio of core asset to core liability should be prescribed to maintain a stable liquidity position.
- iv. **Duration of liabilities and investment portfolio:** In case of fixed income securities the duration of each asset and liability should be estimated. Calculation of duration involves collection of information, such as details of the instrument, market price, etc., on an ongoing basis. In order to ensure that the liquidity base remains stable and exit route remains open, the portfolio duration is to be stipulated.
- v. **Maximum cumulative outflows across all time bands:** Liquidity crisis is an immediate outcome of disproportionate outflow of funds in comparison to the inflows. In order to compensate the fund outgo, fresh inflow of fund may involve an additional cost. As such the cumulative outflow in all time bands should be retained at a particular level.
- vi. **Commitment ratio:** In order to contain the call risk and insulate the system against large outgo of funds causing strain in liquidity, a cap on the commitment is necessary. The information required for the purpose is to be captured from the branches or from the offices dealing with sanctions of advance proposals. A suggested method of collection of data is to impose a cap and till a comprehensive information system is developed such measure should be adequate to control the risk.
- vii. **Swapped fund ratio:** In order to estimate the impact of the rupee fund generated out of foreign currency sources on the liquidity, a cap on swapped fund is to be imposed.

Thus, the cause and effect of liquidity risk are primarily linked to the nature of the assets and liabilities of the bank. All investment and financing decisions of the bank, irrespective of whether they have long-term or short-term implications, do affect the asset-liability position of the bank which may further affect its liquidity position. In such a scenario, the bank should continuously monitor its liquidity

position in the long run and also on a day-to-day basis. Given below are the two approaches that relate to these two situational decisions:

- Fundamental Approach,
- Technical Approach.

These two methods distinguish from each other in their strategical approach to eliminate liquidity risk. While the fundamental approach aims to ensure the liquidity for long run sustenance of the bank, the technical approach targets the liquidity in the short run. Due to these features, the two approaches supplement each other in eliminating the liquidity risk and in ensuring profitability.

FUNDAMENTAL APPROACH

Since long run sustenance is the driving factor in this approach, the bank tries to tackle/eliminate the liquidity risk in the long run by basically controlling its asset-liability position. A prudent way of tackling this situation can be by adjusting the maturity of assets and liabilities or by diversifying and broadening the sources of funds.

The two alternatives available to control the liquidity exposure under this approach are Asset Management and Liability Management. This implies that liquidity can be imparted into the system either by liability creation or by asset liquidation, whichever suits the situation.

Asset Management

Asset management aims to eliminate liquidity risk by holding near cash assets i.e., those assets which can be turned into cash whenever required. For instance, sale of securities from the investment portfolio can enhance liquidity.

When asset management is resorted to, the liquidity requirements are generally met from primary and secondary reserves. Primary reserves refer to cash assets held to meet the statutory Cash Reserve Requirements (CRR) and other operating purposes. Though primary reserves do not serve the purpose of liquidity management for long period, they can be held as second line of defense against daily demands for cash. This is possible mainly due to the flexibility in the cash reserve balances (statutory cash reserves are required to be maintained only on a daily average basis for a reserve maintenance period).

However, most of the liquidity is generally attained from the secondary reserves which include those assets held primarily for liquidity purposes. These secondary reserves are highly liquid assets, which when converted into cash carry little risk of loss in their value. Further, they can also be converted into cash prior to their maturity at the discretion of the management. When asset management is resorted to for liquidity, it will be through liquidation of secondary reserves. Assets that fall under this category generally take the form of unsecured marketable securities. The bank can dispose these secondary reserves to honor demands for deposit withdrawals, adverse clearing balances or for any other reasons.

Liability Management

Converse to the asset management strategy is liability management which focuses on the sources of funds. Here the bank does not maintain any surplus funds, but tries to achieve the required liquidity by borrowing funds when the need arises. The underlying implications of this process will be that the bank mostly invests in long-term securities/loans since the short-term surplus balance will mostly be in a deficit position and further, it will not depend on its liquidity position/surplus balance for credit accommodation/business proposals. Thus, in liability management, a proposal may be passed even when there is no surplus balance since the bank intends to raise the required funds from external sources. Though it involves a greater risk for the bank, it will also fetch higher yields due to the longterm investments. However, sustenance of such high spreads will depend on the cost of borrowing. Thus, the cost and the maturity of the instrument used for

borrowing funds play a vital role in liability management. The bank should on the one hand be able to raise funds at low cost and on the other hand ensure that the maturity profile of the instrument does not lead to or enhance the liquidity risk and the interest rate risk.

Of the two strategies available in fundamental approach, it is understood that while asset management tries to answer the basic question of how to deploy the surplus funds to eliminate liquidity risk, liability management tries to achieve the same by mobilizing additional funds.

Applicability

However, selecting on an appropriate alternative from these two strategies depends to a considerable extent on the size and the nature of the bank operations. For instance, consider a bank that basically concentrates on retail banking and deploys funds based on its deposit level. This suits the retail bank since it has a customer profile comprising mostly household and the small/medium-scale sectors, whose requirement for funds will be reasonably low. Due to this client network, the bank will generally be deposit-rich and proper deployment of these funds into assets can be done to manage the liquidity. Hence, asset management seems to be the appropriate strategy for managing the liquidity position of such a bank.

Differentiating from this retail entity is the large bank which is mostly into wholesale business activities and the fund requirement for which is generally in large quantums. Its customer profile comprises large corporates, other banks and high net worth individuals, and explains the need for such large amounts. Since its exposure is limited only to a selected few customers, its deposit base is poor when compared to the retail bank. However, it has the ability to raise large volumes of funds at short notice. In this scenario, the strategy is the bank can adopt a liability management, so that it can mobilize funds to meet its asset requirements.

After making clear the basic distinction between the deposit-rich and the depositpoor bank, a suitable liquidity management strategy can now be identified for each of them. Consider the statement of assets and liabilities of the Bank of Baroda (BoB) for the year ended xx xx xxxx.

Liabilities	Amount	Assets	Amount
Capital	577.00	Cash and Balances with RBI	3,870.52
Reserves and Surplus	800.03	Call Money	2,656.14
Deposits	28,369.53	Advances	16,012.56
Borrowings	1206.84	Investments	9,594.71
Other Liabilities and Provisions	3116.85	Fixed Assets	223.00
		Other Assets	1,713.32
	34,070.25		34,070.25

(Rs. in Crore)

It can be observed from the balance sheet that the BoB is a deposit-rich bank since it has a basic objective of accepting deposits and financing the industry and other needy sectors. Setting aside the cash and bank balances, advances, fixed and other assets, the Bank has Rs.12,250.85 crore at its disposal. The bank is a net lender in the call/money market as seen from the deployment of Rs.2,656.14 crore against borrowings of Rs.1,206.84 crore including refinance. To stabilize its liquidity position and thereby eliminate liquidity risk, BoB will now have to invest these surplus funds effectively through a proper asset management policy. Thus, asset management involves acquisition of liabilities first and then determining the composition of assets. Investments can be made in the call market, in government securities or instruments of other corporates. When funds are put into the call market, they are invested only for a very short period of time and are rolled over. There is a high level of liquidity in such investments which is, however, attached with a lower yield. Technically, the deployment in call market is unsecured. However, the risk perceived is lower since all the participants in the call market are institutions such as Banks, DFIs, Discount Houses, etc. When compared to call market instruments, government securities offer higher yields and are at the same time highly secured, with moderate liquidity when compared to call market and marketability. The main disadvantage in this investment will be the transaction costs involved while buying/selling the instruments. Compared to the call market instruments and the government securities, the corporate instruments provide lesser liquidity, but at the same time higher returns for the greater risk involved in such investments.

Due to these short-term investments, the bank opting for asset management may have to forego higher yields. To overcome this shortfall, in certain cases of asset management, the bank would like to take the benefit of higher yields by investing long. It can disinvest these long-term securities in the secondary market as and when it needs funds. However, the major considerations in opting for long-term investments are the transaction costs and the secondary market characteristics. The second factor influences the banks' ability to liquidate the asset prior to maturity.

Whichever may be the investment policy, it should, however, be made within the interest rate exposure limits. This implies that an effective asset management policy requires to meet the dual purpose of profitability and liquidity.

After having studied the management of liquidity position from the assets side, consider liability management for tackling the liquidity position. The following is the balance sheet of ICICI Ltd. for the year ended xx xx xxxx.

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Liabilities	Amount	Assets	Amount
Current Liabilities and Provisions	31,661.57	Loans to industrial concerns	2,87,217.59
Indebtness:			
Rupee Loans	2,72,534.88	Investments	73,300.01
Foreign Currency Loans	1,01,950.63	Current Assets, Loans and Advances	64,509.10
Equity	11,132.67	Fixed Assets	31,119.30
Reserves and Surplus	41,921.76	Miscellaneous Expenses	3,055.51
	4,59,201.51		4,59,201.51

The balance sheet of ICICI Ltd., reveals that its sources of funds are basically borrowings from the government and the domestic and international markets. From the assets side, it can be observed that nearly 79 percent of the deployment has been made into long-term assets (investments and loans). Further, the most liquid current assets, which are cash and bank balances and securities as stock-in-trade, are only to the extent of 45 percent of the total current assets (Rs.29,131 million). Thus, being a large player, catering mostly to the high net worth clients, ICICI's liquidity position can be managed by prudent liability management.

The strategy adopted in liability management makes it an aggressive policy. Nevertheless, it enhances the banks' income. This increase will be the outcome of a decrease in the short-term investments and an increase in the long-term credit deployment that offer higher yields.

There are, however, a few inherent risks present in liability management. Firstly, since funds are raised by borrowing from various sources and different markets, rate fluctuations in any of the markets can enhance the cost of borrowing and

thereby increase the interest rate exposure. Secondly, the bank will have to maintain its credibility throughout. Since the borrowings are from qualified institutions and investors who are well aware of the happenings in the market, a default or decrease in its credibility might affect the interest rates and other borrowing terms, costing the bank dearly. Other critical aspects in liability management relate to the sources and the time period for the borrowings. Over-indulgence in short-term/overnight borrowings at low costs should be avoided so as to maintain stability in the sources of funds and also to control the interest rate exposure. At the same time, medium and long-term loans should be selected in a manner so as to reduce asset-liability mismatch. One major consideration for adopting this strategy is that the bank should be in a strong borrowing position lest it may lead to liquidity risk.

TECHNICAL APPROACH

As mentioned earlier, technical approach focuses on the liquidity position of the bank in the short run. Liquidity in the short run is primarily linked to the cash flows arising due to the operational transactions. Thus, when technical approach is adopted to eliminate liquidity risk, it is the cash flows position that needs to be tackled. The bank should know its cash requirements and the cash inflows and adjust these two to ensure a safe level for its liquidity position.

Working Funds Approach and the Cash Flows Approach are the two methods to assess the liquidity position in the short run. Of these two approaches, the former concentrates on the actual cash position and depending on the factual data, it forecasts the liquidity requirements. The latter approach goes a step forward and forecasts the cash flows i.e., estimates any change in the deposits/withdrawals/credit accommodation, etc. Thus, apart from assessing the liquidity requirements, it also advises the bank on its investments and borrowing requirements well in advance. Discussed below are these two models of technical approach used for liquidity risk management.

Working Funds Approach

Under this approach, liquidity position is assessed based on the quantum of working funds available to the bank. Since working funds reflect the total resources available with the bank to execute its business operations, the amount of liquidity is given as a percentage to the total working funds. The bank can arrive at this percentage based on its historical performance. This approach of forecasting liquidity requirement takes a broad overview of the liquidity position since the working funds are taken as a consolidated figure.

The working funds comprise of owned funds, deposits and float funds. Instead of a consolidated approach, the bank can have a segment-wise break up of the working funds to arrive at the percentage for maintaining liquidity. Based on the position of the limit arrived as above and the available liquidity, the bank will have to invest/borrow the surplus/deficit balances to adjust the liquidity position. In this approach, the bank will have to assess the liquidity requirements for each of the components of working funds.

The liquidity for the owned funds component, due to its very nature of being owner's capital will be nil. The second component of working funds is deposits, the liquidity requirements of which depends on the maturity profile. Thus, prior to assessing the liquidity requirements of these deposits, the bank should categorize them into different segments based on the withdrawal pattern. All deposits based on their maturity fall under the following three categories:

- Volatile Funds
- Vulnerable Funds
- Stable Funds.

Volatile funds include those deposits which are sure to be withdrawn during the period for which the liquidity estimate is to be made. These include, short-term deposits like the 30 days deposits, etc., raised from the corporate/high net worth clients of the bank. The probability of these funds being withdrawn before or on

their maturity, is high. Included in this category of volatile funds are current deposits of corporates which also have a high degree of variability. Due to the nature of the volatile funds, they demand almost 100 percent liquidity maintenance since the demand for funds can arise at any time.

Deposits which are likely to be withdrawn during the planning tenure are categorized as *vulnerable deposits*. A very good example of this type of deposits are the savings deposits. However, the entire quantum of savings deposits cannot be considered as vulnerable. On an average, it can be observed from the operations of the bank, that there will be a certain level up to which these funds are stable i.e., the level below which the funds will not be withdrawn. Hence, the liquidity requirement for savings deposits will generally arise from its variable portion. The liquidity requirements to meet the maturity of the vulnerable funds will be less than 100 percent and varies depending upon the risk-return policy of the bank.

Finally, the residual of the deposit base after segregating them into the above two categories will fall under the *stable funds* category. These deposits have the least probability of being withdrawn during the planning period and hence the liquidity to be maintained to meet the maturing stable deposits will also be lower when compared to the other two types of deposits. As explained above, the stable portion of the savings deposits fall under this category. Most of the term deposits, by their nature fall under this category.

Float funds which are the third component of the working funds are much similar to the volatile funds. These funds are generally in transit and comprise of DDs, Banker's cheques, etc., which may be presented for payment at any time. However, this segment also has a minimum level over and above which the variability occurs. Hence, a 100 percent liquidity will have to be provided for the variable component.

Based on the working funds, consolidated or component-wise, the bank will have to assess the cash balances/liquidity position in the following manner:

- By laying down the average cash and bank balances to be maintained as a
 percentage of total working funds.
- By laying down the range of variance which can be taken as the acceptance level.

Having obtained the consolidated/component-wise working funds, the bank will now have to estimate the average cash and bank balances that are to be maintained. This average balance can be maintained as a percentage of the total working funds. This percentage level is based on forecasts, the accuracy levels of which vary depending on the factors affecting the cash flows. Hence, it is advisable for the bank to set-up a variance range for acceptance depending on its profitability requirements. Thus, as long as the average balances vary within this tolerance range, profitability and liquidity are ensured. Any balance beyond this range will necessitate corrective action either by deploying the surplus funds or by borrowing funds to meet the deficit. This acceptance level is, however, a dynamic figure since it depends on the working funds which may keep changing from time to time.

Illustration 1

MM Financial Institution Ltd. (MMFI) which has been offering banking and investment services for the past 2 decades, has a branch network of 250. The working funds of MMFI at the end of 20x1-20x2 are Rs.1,500 crore. The average cash balances are maintained at 1 percent of the total working funds. Further, the management has decided that to ensure proper liquidity, the acceptance range for variance can be up to 5 percent.

With this data compute the following:

- a. The average cash balance to be maintained and the acceptance range.
- b. The average cash balance and the acceptance range, if the working funds have increased to Rs.2,300 crore.

Solution

a.	Average cash balance	=	$1,500 \ge 0.01 = \text{Rs.}15 \text{ crore}$
	Acceptance range	=	$15 \pm (15 \ge 0.05)$
		=	Rs.14.25 – 15.75 crore.

Thus, the cash balances of MMFI can lie between Rs.14.25 – 15.75 crore.

b.	Average cash balance with increased working funds						$= 2,300 \times 0.01 = \text{Rs.}23 \text{ crore}$		
	Acce	eptance ra	inge						$= 23 \pm (23 \ge 0.05)$
									= Rs.21.85 – 24.15 crore.

Thus, if the working funds of the bank are increased to Rs.2,300 crore the range for maintaining cash balances will be = Rs.21.85 - 24.15 crore.

In case the variance in the cash balances is beyond this range, the bank should take the corrective measures. However, before taking any such measures it is advisable for the bank to first identify the reasons for such variances. If there has been any fundamental change in the operating environment of the bank, then the variance in the cash balance will generally be long-term in nature. Thus, there will be a need for adjusting the cash balances as per the situation. However, in cases where the deviation in the cash balances has been due to certain short-term changes in the market, the variance will not last for long and hence it may not necessitate any corrective action.

Of the two different methods of forecasting within the working funds approach, the consolidated method suits the bank which is mainly playing the role of a development bank. This is basically due to its small deposit base and less volatile working funds. Distinguished from this bank is the deposit-rich commercial bank, which has a greater component of working funds falling into the deposits category. Due to this, the volatility level is also higher and hence the consolidated approach of working funds may not indicate the real liquidity requirements. In such a case, a component-wise assessment of liquidity would be a better alternative.

The working funds approach of estimating the liquidity position, however, has a few limitations: Firstly, it is a subjective decision to some extent to classify deposits based on their withdrawal pattern. Secondly, the focus is laid only on existing deposits and it ignores potential deposits. Thus, the forecasts may go haywire when there is an unanticipated change in incremental deposits and loan demands. To avoid subjectivity, the variation in different types of deposits may be considered based on the historical data. The percentages can be worked out as weighted average of individual segments. However, the methodology involved in the computation of the percentages will be different for different banks since it depends on the deposit mobilization, branch networking and the liquidity policy of the banks.

Cash Flows Approach

This method of forecasting liquidity tries to eliminate the drawback faced in the Working Funds approach by forecasting the potential increase/decrease in deposits/credit accommodation. To tackle such a situation, a trend can be established based on historical data about the change in the deposits and loans.

Before proceeding to discuss about the cash flows approach it is essential to understand two important parameters that relate to the approach. Firstly, it is the decision regarding the planning horizon for the forecasts and secondly, the costs involved in forecasting.

The planning horizon of a bank may be a financial year or a part of it i.e., a few months to a quarter/half-year period. The bank should ensure that the planning horizon for estimating the liquidity position should neither be too long nor too short if the benefits of forecasting have to be reaped. There are various factors both external and internal to the bank which have an impact on the forecasted cash flows. Thus, when the forecasts are made for a long period they might actually not

Managing Liquidity Risk

remain the same thereby affecting all the decisions that have been taken based on such forecasts. Similarly, when the planning horizon is too short, decisions relating to borrowings and investments may not be effective enough to increase profitability. Considering these factors, the bank should decide on a period which will not affect the forecasted cash flows to a large extent and at the same time will enable it to make optimal investment-borrowing decisions.

Forecasting cash flows to assess and manage the liquidity position of the bank, however, involves an expenditure. These forecasting costs can further be classified into recurring costs and non-recurring costs. Non-recurring costs are those which occur when the cash forecasting process is initiated by the bank. These include cash outflows for installation of the necessary information system that collates and maintains the data necessary for forecasting. On the other hand, there are certain recurring costs occurring on a regular basis which include the man-hours spent, data transmission costs and the maintenance of the systems used for this process.

These forecasting costs incurred further depend on three important factors viz., branch networking, forecasting periods within the planning horizon and the details of information required for forecasting. By nature, these three factors have a direct influence on the forecasting costs. This can be explained by the fact that if the bank has a wide branch network, it will definitely have to incur more expenditure since data has to be collated from such a wide network accurately and at regular intervals. Similarly, when the bank plans to forecast its cash position for every month during the planning horizon of, say a year, the cost of forecasting will be more as compared to the expenditure incurred for forecasting for every quarter/half-yearly period. Higher costs are involved when detailed information is sought.

The bank should first decide on the planning horizon that suits its operational style and then based on the cost constraint decide on the number of forecasting periods and other such details. The assessment of the liquidity position based on the forecasts made for the cash inflows and outflows follow such decisions.

The basic steps involved in this process are as follows:

- Estimate anticipated changes in deposits,
- Estimate the cash inflows by way of loan recovery,
- Estimate the cash outflows by way of deposit withdrawals and credit accommodations,
- Forecast these for the end of each period, and
- Estimate the liquidity needs over the planning horizon.

The most critical task of liquidity management is predicting the expected cash inflows coming by way of incremental deposits and recovery of credit and the outflows relating to deposit withdrawals and loan disbursals. In this process, the accuracy levels when a bank forecasts cash outflows by way of deposit withdrawals and credit disbursals are fairly high when compared to the cash inflow forecasts relating to loan repayments and deposit accretion. This difficulty in the forecasting of cash flows coupled with the mismatches arising due to the maturity patterns of assets and liabilities result in the liquidity risk. Thus, the process of forecasting cash flows with a high degree of accuracy holds the key to risk elimination.

All estimates are generally given as at the beginning of the month or at the end of the month and are silent upon the fluctuations that may occur during the month, when the forecasting period is chosen as a month. In order to manage the intra-month liquidity problems, there should always be a surplus balance. In such a scenario, it is always better for the bank to consider that the deficit occurs at the beginning of the period while the surplus occurs at the end of the period. Thus, funds should be provided to meet the deficit balance at the beginning of the forecasting period.

Illustration 2

Sunrise Banking Corp. Ltd., is into the banking business for more than a decade. The increased competition and the volatile markets have affected its spreads and the liquidity position. On analyzing the situation, the management of the bank realized that improper cash balances was one of the reasons that led to such a position. To optimize the use of its cash balances and at the same time ensure liquidity, the management plans to draw up a proper cash forecasting plan. The cost of forecasting is expected to be Rs.2 lakh per period. The management has the following two options of forecasting for the first half of 20x2-20x3.

Option I: Quarterly forecast

The cash forecasts for the year 20x2-20x3 suggest that there will be a surplus balance of Rs.23 crore and a deficit balance of Rs.10 crore for the first and the second quarters respectively.

Option II: Monthly forecasts

-	-	((Rs. in crore)
Month	Period in months	Inflows	Outflows
April	1	81	62
May	2	74	78
June	3	88	80
July	4	76	88
August	5	65	72
September	6	79	70

Based on the given information,

a. Forecast the liquidity position at the end of the planning periods for each option.

b. Calculate the cost of forecasting for each option.

Solution

a. **Option I:**

Forecast is to be made for two quarters.

Forecasted cash balance for the first quarter = Rs.23 crore (surplus)

Forecasted cash balance for the second quarter = Rs.10 crore (deficit)

Since the forecast does not indicate the exact period of deficit, it is preferable for the bank to maintain a cash balance of Rs.10 crore from the beginning of the second quarter. Thus, while making a decision for investments, the bank will have to maintain Rs.10 crore as balance to meet the deficit position and invest the remaining surplus funds.

Surplus cash remaining for investment after adjusting for the deficit = 23 - 10 = Rs.13 crore.

The surplus of Rs.13 crore can be invested for one quarter from the beginning of the second quarter.

Option II:

Ta	bl	le	1	

					(Rs. in Crore)
Month	Period	Inflows	Outflows	Net flows	Cumulative
April	1	81	62	19	19
May	2	74	78	- 4	15
June	3	88	80	8	23
July	4	76	88	-12	11
August	5	65	72	_7	4
Sept.	6	79	70	9	13

With such a detailed forecasting, there cannot be a unique investment procedure to suggest. The bank can either invest its surplus funds for a short period and roll it over, otherwise invest the same for a longer period. With the above data, the funds available for investment are assessed as shown in Table 2.

	Surplus for i	nvestment	
Month	Beginning of the	End of the month	Remarks
	month		
April	—	19	Surplus is assumed to arise at the end of the month.
May	19 -4	15	Balance at the beginning of May is adjusted for deficit balance in May (19-4).
June	15	15 + 8	The surplus occurring at the end of June is added to the surplus balance at the beginning of June.
July	23 – 12	11	The deficit balance of Rs.12 crore arising in July is adjusted with the surplus balance of Rs.23 crore at the beginning of the month. For this adjustment first Rs.8 crore, surplus balance arising in June is considered and the balance of Rs.4 crore, from the remaining balance of Rs.15 crore.
August	11 – 7	4	Balance at the beginning of August is adjusted for deficit balance of Rs.7 crore.
Septem -ber.	4	4 + 9	Rs.9 crore, is the surplus balance available at the end of September.

Table 2

b. Cost of forecasting in Option I = $200000 \times 2 = \text{Rs.}0.04$ crore

(since forecasting periods are 2 quarters)

Cost of forecasting in Option II = $200000 \times 6 = \text{Rs.}0.12$ crore

(since forecasting periods are 6 months)

Thus different sets of information may lead to different decisions, which can be as follows:

In the first case, when the forecast was made for fewer periods, the management will be unprepared to meet the impending deficit balances during the intermediate periods. This lack of information may further lead to a liquidity crisis. In order to avoid this, the bank may have to maintain higher liquidity levels than warranted. However, by having an elaborate cash budget for differing periods, the management will be able to foresee its cash requirements at various periods and further guide its investment decisions.

Nevertheless, preparation of such an exhaustive information based on cash forecast will be possible only in cases where the operations are centralized or where the bank has a very good networking with its branches. However, a bank which has a large branch network without a proper MIS in place for data transmission, can rely more on the first approach and set the range for the average cash and bank balances.

Whichever may be the method of forecasting, due consideration should be given to the external factors that are likely to affect the forecasts. These factors include variation in business cycle conditions, monetary policy, etc. For example, in periods of business expansion, the level of inventory is relatively high. In such cases, the bank should expect an increase in demand for short-term loans. In addition to this, sometimes there will be an increase or decrease in the availability of bank credit due to changes in the monetary policy. In India, the monetary policy is announced twice a year – once for the busy season (October) and the other for the slack season (April). The recent change in the approach of RBI towards monetary policy leads to a situation where changes are likely to occur on a continuing basis instead of at halfyearly intervals. When the industry environment is on an upswing and restrictions are placed on bank credit, then the liquidity position of the bank will be affected. Further, the situation will become severe when the deposit accretion takes place at a diminishing rate. Thus, while making forecasts for loans and deposits to assess the liquidity position, all these external factors must be taken into consideration.

INVESTMENT-BORROWING DECISIONS

Assessment of the liquidity gap based on the forecasts is essentially one aspect of liquidity management. The other major task of liquidity management is to manage this liquidity gap by adjusting the residual surplus/deficit balances. Considering the high costs associated with cash forecasting, it is essential that the benefits drawn by the bank from such forecasting should be substantially large to give some residual gains after meeting the forecasting costs. This objective can, however, be attained only if the bank makes prudent investment/borrowing decisions to manage the surplus/deficit.

There are, however, a few factors that must be considered before deciding on the deployment of excess funds/borrowings for meeting the deficit, and these are given below:

- Deposit withdrawals;
- Credit accommodation;
- Profit fluctuation.

The liquidity level a bank maintains should firstly provide for *deposit withdrawals* and secondly accommodate the increase in credit demands. While deposit withdrawals must be honored immediately, it is also of priority to ensure that legitimate loan requests of customers are met regardless of the funds position. Satisfactory *credit accommodation* ultimately results in more business for the bank.

Liquidity is further influenced by the *fluctuation in the business profits* of the bank. It has already been explained that any fluctuation in the interest rates may result in an increase/decrease in the NIM of the bank. If this fluctuation results in a negative growth i.e., a decrease in NIM, then the bank should review its RSAs and RSLs. It might thus resort to gap management which might affect its liquidity position. On the contrary, when the profits are showing increasing growth rates, the bank would prefer to maintain tighter liquidity position by utilizing the cash balances for investments/loan disbursals. This further improves its profitability levels.

Considering these factors, the bank should adjust its surplus/deficit to meet the liquidity gap. While surplus funds can be invested in short/long-term securities depending on the bank's investment policy, the shortfalls can be met either by disinvesting the securities or by borrowing funds from the market. This again will depend on the strategical issue of whether the bank prefers to manage its liquidity risk using asset management or liability management. If the bank decides to go for liability management, then the investment policy will be long-term. Consider illustration 2 where the planning horizon is 6 months and the forecasting period is 1 month. If the bank opts for liability management, then the surplus of Rs.19 crore arising at the end of April will be invested for the next 5 months, and to meet the

deficit arising at the beginning of May, the bank will borrow Rs.4 crore for 2 months (i.e., May and June - as there is a surplus arising at the end of June). On the other hand, if the bank adopts asset management and hence opts for short-term investment policy, then the bank will adjust the deficit arising in May with the surplus of April and invest the remaining funds (i.e., 19 - 4 = Rs.15 crore) for May and June (since there is again a deficit arising at the beginning of July). Tactical issues influence the strategic issues of bank's investments. While the bank may use asset management or liability management in their investment decisions, they may nevertheless face certain critical changes in their operational environment which make the strategical policies unsuitable. This implies that if the banks' strategic policy is liability management in an increasing interest rate scenario, such a policy will not be advisable. In such a case, the bank will have to go for asset management until the time the interest rates stabilize and revert back to the liability management. Thus, while the bank can take its investment decisions based on its strategical policy, the same will have to be reviewed to adopt tactical policy to suit the changes in the operating environment. The important criteria in taking such decisions will also be the yields on investments and the cost of borrowings.

Surplus Balance

In case of a surplus balance, the bank has the option of either maintaining cash balances or investing these excess funds in securities/loan assets. Though holding adequate cash reserves can eliminate the liquidity risk completely, the costs involved in doing so could be prohibitive, especially for a bank. Hence the bank should make optimum use of its idle funds by investing in such a way that the yields earned are greater.

There are generally two options available to the bank while it makes its investment decisions. It can invest either for a short-term and roll over until the funds are required for some other purpose or, invest for a longer period after properly assessing the cash requirements through the forecasting process.

In this decision-making process one has to, however, consider/understand the behavior of the yield curves on the long/short-term investments. Yield curves often are sloping upward since higher interest rates are associated with long-term and relatively less liquid assets. The converse of it holds good in case of short-term assets. Further, the expectations theory which explains the relation between the interest rates and the investment period does not hold good in reality. These occurrences explain the fact that the long-term investments do give higher yields than short-term investments. The bank will also have to consider the transaction costs involved while converting its marketable securities.

Illustration 3

Period (months)	Yields (%) p.a.
1	7.25
2	7.50
3	7.75
4	8.25
5	8.50
6	8.75

Consider illustration 2 and the additional information given below. The following are the yields that are expected to be earned on the investments for different periods:

With this additional information, calculate the expected returns under both the options and also the net benefit arising due to forecasting.

Solution

Option I:

If asset management is adopted, then the amount that can be invested is Rs.13 crore. This amount will be available for a period of 3 months.

Returns on investment = $13 \times 0.0775 \times 3/12 = \text{Rs.}0.252$ crore

If liability management is adopted, then the bank will invest Rs.23 crore surplus arising at the end of the first quarter for the 3 months and will borrow Rs.10 crore deficit arising at the beginning of the second quarter, for a period of 3 months.

Returns on investment	$= 23 \times 0.0775 \times 3/12$	= 0.446
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Cost of borrowing	$= 10 \ge 0.0775 \ge 3/12$	= 0.194
Total returns		= 0.252

It can be observed in this case, that both the long-term and short-term investment policies result in the same returns for the bank, since the investment and borrowing periods are same.

From this, the net benefit to the bank can be assessed as follows:

	(Rs. in Crore)
Returns on investment	0.252
Less: Cost of forecasting	0.040
Net benefit from the forecast	0.212

Option II:

In this option, the two alternatives for investment, long-term investment/short-term investment will result in different benefits due to the differing periods of investment/borrowing.

Long-term investment policy: Since liability management is adopted for long-term investment policy, all the surplus funds will be invested and all deficits will be met through borrowings. The assumption here is that the interest rates will remain stable.

The surplus of Rs.19 crore arises at the end of April and will be invested for the next 5 months and the surplus of Rs.8 crore arises at the end of June and will be invested for the next 3 months.

Returns on investments $= \left(19 \times \frac{5}{12} \times 0.085\right) + \left(8 \times \frac{5}{12} \times 0.075\right)$ = 0.828

The deficit of Rs.4 crore arises at the beginning of May and continues till the end of June when the surplus arises and hence the amount has to be borrowed for 2 months. The deficit of Rs.12 crore will have to be met by borrowing funds for 1 month and the deficit of Rs.7 crore arising at the beginning of August will be met by borrowing funds for 2 months i.e., till the end of September when the surplus arises.

Cost of borrowing $= \left(4 \times \frac{2}{12} \times 0.075\right) + \left(12 \times \frac{1}{12} \times 0.07255\right)$ $+ \left(7 \times \frac{2}{12} \times 0.075\right)$ = 0.21 = 0.828 - 0.21 = Rs.0.618 crore = Rs.0.12 crore = Rs.0.498 crore = Rs.0.498 crore *Short-term investment policy:* In case the bank decides to invest for shorter periods, then according to asset management, it will have to adjust for deficits and then invest the surplus. Thus, it can invest Rs.15 crore for 2 months (May – June), Rs.11 crore for 1 month (July) and Rs.4 crore for 2 months (August – September).

The returns for such investment profile will be as follows:

Total returns	=	(15 x 0.075 x 2/12) + (11 x 0.0725 x 1/12) + (4 x 0.075 x 2/12)
	=	Rs.0.304 crore
Cost of forecasting	=	Rs.0.12 crore
Net benefit arising out of the forecast	=	0.304 - 0.120 = Rs.0.184 crore

	(Rs. in Crore)
	Net Benefit
Option I:	0.212
Option II:	
Short-term investment	0.184
Long-term investment	0.498

On comparison, the net benefit arising on account of forecasting is the highest when the bank invests in long-term instruments (i.e., liability management). If the bank has to increase its net benefit further, it can increase the number of periods for forecasting. However, there will be a limiting point beyond which the increase in costs will be higher than the increase in revenues.

It can be further understood from the above illustrations 2 and 3 that the decision to invest the excess funds is influenced by the amount of time the surplus reserve position will sustain. In addition, it also depends on the accuracy of forecasts. Thus, long-term investment in securities/credit advances generally should not be considered unless it is expected that the reserve surplus is for a long period. Even though there is an anticipation of surplus, there is a great degree of uncertainty associated with such expectations. In such cases, it is advisable for the bank to invest the funds for a short-term and observe if such surplus continues. In case the surplus turns out to be for a long-term, then appropriate adjustments can be made by reserve-modifying actions.

Deficit Balance

The second important question that the bank will have to face is, how to meet the deficit cash balances. The only alternative available to meet its deficit is by borrowing funds from the market. While doing this, the aim of the bank should be to keep its cost of raising such short-term funds as low as possible.

The bank also has an option of meeting its deficit by internal sources by adjusting against surplus balances obtained earlier. In this option, the number of forecasting periods play a vital role. This concept has been explained in illustration 3. Internal funds can be effectively used when the cost of borrowing is relatively high.

There are various models, which discuss the suitable ratio that can be maintained between the cash balance and the investments. Two models which have been commonly used are the Baumol Model and the Miller and Orr Model. The Cash Management model given by Baumol extends the Economic Order Quantity concept used in inventory management to discuss the cash conversion size, which influences the average cash holding of the firm. This model analyzes the income foregone when the banking company holds cash balances (rather than investing the same in marketable securities) against the transaction costs incurred when the marketable securities are converted into cash. The Miller and Orr Model considers

that there will be different cash balances at different periods and thus a bank should accordingly decide on the amount and the timing for the transfer of funds from marketable securities to cash.

The criteria while taking such decisions, therefore, will be to increase yields on investments and lower the costs of borrowings. Thus there should be optimization in the investment-deposit ratio to ensure that the level of idle funds/low yield funds at any point of time is not as high so as to cut into the profitability of the bank. This trade-off decision of the bank depends on its attitude towards the liquidity policy i.e., aggressive/conservative. Depending on the liquidity position to be maintained, and considering the risk preferences and risk factors, the management can have a policy which has a relatively large/small amount of liquidity.

Securitization

Yet another method of imparting liquidity into the system is by way of Securitization. There is, however, a remarkable difference in the strategy used in this approach when compared to the earlier models. Distinguishing itself from the earlier methods which resort to a sale of securities/borrowings as and when the need for funds arises, securitization can impart liquidity on a continuous basis and has little or no relation to the surplus/deficit balances. The loan profile of the bank will generally be long-term in nature. Large volumes of funds get blocked in project financing and asset financing activities of the institution. Securitization is an effective way to release these funds for further investments. In securitization, the future cash flows from the advances made by the bank are repackaged into negotiable securities and issued to the investors. This arrangement induces liquidity into the system by imparting liquidity to the highly illiquid assets. In the process of enhancing liquidity, securitization also reduces the interest rate exposure for the bank since risks associated to the rate fluctuations will also be eliminated. Securitization can in fact be taken up on a continuous basis to supplement the other approaches.

SUMMARY

- There are various methods available to tackle the liquidity risk. The bank should select a technique which suits its operating environment and business policies. This technique should lay down a liquidity plan that avoids in all possible circumstances the chances of a cash shortage/surplus.
- Further, the alternative will have to work within the interest rate exposure limits set for the bank. However, merely considering the interest rate exposure limits will not suffice. The management should also have generated the tolerance limits for the liquidity ratio based on the past performances. Working between these two limits, the bank should select the maturity patterns and risk profiles of its assets and liabilities in such a way that it strikes a balance between being overtly liquid and relatively illiquid.

<u>Chapter VII</u> Operational Risk Management

After reading this chapter, you will be conversant with:

- Operational Risk and its Evolution
- Major Sources of Operational Risk
- Measurement of Operational Risk
- Management of Operational Risk

The banking environment is continuously changing. The comfort of an insulated environment offered by regulations in the past is vanishing. The resulting uncertainties give rise to risks, and make it imperative to call for risk identification, measurement and management. One such all-pervasive risk that banks face is operational risk. It is one of the oldest risks in banking that has been managed all along quite informally but of late has suddenly caught everybody's attention. This increased attention could be owing to the expansion in the range of activities being pursued in the recent past, perceived increase in operational risk itself, reaction to major loss events that have occurred internally, threat of increased competition by virtue of blurring boundaries among financial services providers, information technology initiatives and the resulting falling spreads, management commitment for enterprise-wide risk management, regulatory attention, etc.

Sound operational risk management is essential to counter any real operational risk of a financial institution in order to promote stability in the financial system as a whole. Risk management is often defined as hedging or neutralizing the financial risk that results from a series of transactions. Effective operational risk management is the mixture of policies, procedures, expertise and systems that the institution needs to manage all the risks associated with banking business. It includes matters such as inappropriate organizational structure, unavailability of systems, business failures, defective controls, fraud, and human error. Further modification of operational procedures and controls are necessary as risk management becomes more challenging in a fast paced market. Recent market occurrences have also created a particularly strong sentiment for establishing an effective risk management practice.

Failure to adequately manage operational risk can negatively impact profit/loss, not only resulting from the costs of incorrect settlement of transactions but also from managing incorrect positions or taking unknown credit risk. It is essential to know that the basic risk management practices are the division of duties between operational personnel and trading personnel. They have been responsible for confirmation and for settlement and must maintain a reporting line independent of trading where the trading takes place. The financial industry has been recently reminded of this very essential control first with Barings and again with Daiwa Bank. Both these incidents have prompted the organizations to focus on traders and market practices as well as on operational control.

Operational controls are important to risk management process. Effective controls help the banks to detect and identify problems before incurring financial loss. Many organizations and institutions started responding to this risk by implementing tighter controls within their operations. However, managing operational risk encompasses managing business processes, human technology and capital.

Traditionally, the concept of risk from financial markets has focused on financial risks and derivative products. Despite this fact, the industry has generally allocated few resources and limited attention to the active management of operational risk. Within the financial markets, risk management focuses too often on the market and the credit risk. A fully integrated approach to risk management involves determining the company's risk appetite and setting up of the risk agenda. This tends to give more support to the management that is proactive. A comprehensive approach to risk management covers three key aspects of business organization – its strategy, its processes and its people. By adopting this, companies as well as organizations can improve the profitability of their businesses, either by removing the cost of existing control tasks, or by taking more risk.

OPERATIONAL RISK AND ITS EVOLUTION

Though operational risk is as old as banking, preceding even market and credit risk, its definition is still evolving with no unanimously agreed-upon, universal definition. Operational risk is often defined by what it is not: Any risk that is not related to credit, market and liquidity risks. Different banks perceive it in different ways as could be gauged from the following (Operational Risk: the next frontier, 1999):

- Any risk not categorized as market or credit risk;
- A risk of loss arising from various types of human or technical error;
- Risk associated with settlement or payment risk and business interruption and legal risk;
- Risk of frauds by employees and outsiders; unauthorized transactions by employees and errors relating to computer and telecommunication systems;
- The potential exposure to missed opportunity or to unexpected financial, reputational, or other damage resulting from the way in which an organization operates and pursues its business objectives;
- Risk arising from inadequate systems, operational problems, breaches in internal controls, fraud, and unforeseen catastrophes resulting in unexpected losses for the organization. Essentially, operational risk is present in every aspect of the business processe undertaken by the organization and in the systems, procedures, and personnel employed to administer those processes.

The definitions of Operational Risk traditionally focus on the risk associated with operations/transactions processing. Many banks perceive processing risk is of primary importance with the highest potential magnitude of consequences. Some banks do not agree to classify settlement, collateral and netting risk under operational risks. Some banks treat technology risk as operational risk, while some view it as a separate risk category. But all banks see some form of link between market, credit and operational risk.

Some banks consider business risk as the second most important risk and hence prefer to include it under operational risk. Some, however, argue that as business risk is imparted more by market volatility, it should be included in market risk. Yet others are preferring to treat it as a separate risk such as credit and market risk. In this context, one needs to appreciate the fact that it is the business strategy which, normally indicates the business domain and the products and services to be offered; differential advantage sought in terms of quality, price, service, and the basis on which these are to be achieved; strategic thrusts through selected programs and their timing and the goals. Secondly, it defines the overall desired portfolio of a bank and major moves regarding retention, addition or deletion of business segments, consolidated resource mobilization and plans. Thirdly, if we accept the definition of operational risk as "everything but market and credit risk", business risk gets automatically included under the umbrella of the operational risk. Viewed against this perspective, there appears to be a case for inclusion of business/strategy risk under operational risk.

The Basel Committee on Banking Supervision defined Operational Risk as, "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events". A similar expression echoes from the definition given by PricewaterhouseCooper based on its survey of a few global banks: "Operational risk is the risk of direct or indirect losses resulting from inadequate or failed internal processes, people and systems or from external events". These definitions have indeed captured the whole horizon of operational risk except for "business-strategic risk", though it is equally critical.

Many industry leaders consider "human behavioral risk" as the most challenging aspect of operational risk. Many of the operational risk-related functions such as regulatory compliance, finance management, frauds, IT, legal, and insurance are carried out by the employees (Blunden, AC and Hill VJH 2000).

Operational risk is perceived to be highly capable of impacting business lines that have high volume and high turnover coupled with low-margins. The Survey of Operational Risk carried-out by PricewaterhouseCoopers in 1997 in conjunction with the British Bankers' Association in the banking industry revealed that high levels of loss occurred in the categories of system failures, criminal acts, legal action, erroneous funds transfer, business interruption costs and damage to assets. The survey also revealed that –

- An average of 30% of respondents in banks do not evaluate the impact of operational risk;
- Of those that do, 44% use risk-ranking techniques;
- Only a few use more sophisticated risk models to estimate the impact and probability of risks; and
- The rest use a variety of other undefined methods.

The results of the survey also suggest that fresh research is needed in the areas of:

- Rigorous evaluation and measurement of operational risk;
- Education and awareness of Board of Directors on an enterprise-wide basis;
- Providing the required information to the management and Board of Directors to enable them to make timely and well-founded decisions; and
- Framing formal policies, definitions and approaches.

In view of the complexity of operational risk, it is essential for any bank to define operational risk in its own terms as understood in the context of its organization and particularly communicate the same to the staff members for, without a fair understanding of the organization's philosophy of risk management, no effective implementation could be possible.

Managing Operational Risk

Financial institutions need to adopt integrated, proactive programs for managing operational risk in order to avoid the recurring operating losses, to face the growing complexity of the trading environment and to meet the client demand.

Without proper management of operational risk, an organization cannot control its market and credit risk exposure. To do this effectively, it is necessary to have the relevant skills in various fields and knowledgeable staff, technical and good infrastructural facilities as well as control systems.

Measuring Operational Risk

Considerable work is being done by many people in defining operational risk and the ways of managing it. Operational risk does not easily lend itself to financial quantification. The nature of operational risk makes quantitative assessment very difficult. However, institutions have initiated steps for measuring operational risk. These include charging a fixed or proportional rate on the cost incurred, using various statistical models based on historic information about losses and loss events.

Box 1: G-50 and Basel Committee Reports on Risk Management														
In	the	past	few	years,	there	have	been	many	reports	on	the	issue	of	risk
ma	nage	ement	and	control.	Twon	reports	which	n merit	mention	are	:			

- Derivatives: Practices and Principles, G-30 report published in July 1993.
- 2. Risk Management Guidelines for Derivatives, written jointly by the Basle Committee on Banking Supervision and the IOSCO.

As per these reports, the fundamental roles for effective management of operational risk are:

- The importance of defining the scope and policy of the firm's involvement in and use of the various financial instruments at the highest level of the organization.
- The need for a risk management process that involves continuous measuring, monitoring and controlling of all risk.
- The need for accurate and reliable management information with comprehensive limits.
- The need for sound control and operational system.
- The need for thorough audit and control procedure.

Source: ICFAI Research Center.

Risk Management Framework

In looking at corporate level risk framework, the organization needs to ensure that the various key areas are in place. These areas include organizational issues and people issues as strategy, structure, people skills and technological issues such as data mining and risk management tools. The organizational issues include development of a risk management strategy, and risk culture, defining management role and responsibilities. When it comes to people issues, the relevant type and caliber of people, the adequate levels of training and development of staff, the basic skill levels come to the fore. And finally, the technology issues include adequate systems to support the various product lines, infrastructure, data warehouse, credit monitoring and credit risk management.

Box 2: Operational Risk – A l	Hard Nut to Crack
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Operational risk arises from the risk of unexpected losses arising from deficiencies in a firm's management information, support and control systems and procedures. Thus, risk management should focus on the identification of these potential

unanticipated events and on their possible impact on the financial performance of the firm and at the limit on its survival.

It is too tempting to classify all those risks that are not included in either the credit risk or market risk as Operational Risk. The Basel Committee's definition or Operational Risk is "the risk or direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events". This definition includes legal risk as well. The use of more highly automated technology, the growth of e-commerce, large-scale mergers and acquisitions that test the viability of newly integrated systems, the emergence of banks as very large-volume service providers, the increased prevalence of outsourcing and the greater use of financing techniques that reduce credit and market risk, but that create increased operational risk, all suggest that operational risk exposures may be substantial and growing.

The Basel Committee Report on Operational Risk Management mentions that a few international banks do have systems to measure operational risk but they are yet to the classified as satisfactory or acceptable. Experimental measures adopted by a few banks identified factors like internal audit ratings, volume, turnover, error rates and income volatility as indicators or the levels of operational risk. The management of operational risk is more complicated and requires integration with the other risk management strategies. Internal controls and internal audit are the two basic tools for controlling operational risk.

The Role of Senior Management

The Boards of Directors should approve procedures and controls to implement the polices at all management levels. The senior management should be able to identify and understand the types of risk hidden in the organization activities and to ensure the various lines of business are managed effectively. A good and sound risk management culture within the organization is a must. The managers must have independent access and direct lines of communication with board members. They should be provided with proper training and education to ensure they understand the benefits and risks of various financial instruments like derivatives etc. There should be good and effective rewards for the trading staff or corporate treasurers. In addition to this, there must be a supervisory role to ensure controls and compliance with procedures. Senior managers need to identify adequates segregation of duties between risk management and control personnel.

Risk Management Culture

The concept of risk management within the financial industry has frequently been associated with financial loss or fraud. Generally these occur when something wrong takes place or when an organization incurs substantial loss. This will lead to preoccupation and excessive focus on administrative processes and controls rather than outcomes and performances. This creates fear, uncertainty and suspicion among the staff. In order to make risk the responsibility of the staff at all levels the organization needs to develop a risk management culture. This means that system and process are designed with risk management in mind while staff development and training focuses on effective risk management practices, as this alone will ensure that the organization will be able to manage risk effectively.

Enterprise-wide Co-ordination

In order to effectively manage enterprise-wide-risk, the risk management functions need to have cross-functional responsibility with a direct reporting line to the Board of Directors. This allows the co-ordination of risk management across different business units. Effective coordination in the organization helps establish and communicate risk policies in a better and effective way.

Box 3: Models of Operational Risk

Operational risk measurement techniques fall under two basic approaches namely top-down approach and bottom-up approach. The first approach takes aggregate targets, such as net asset value or net income to analyze the operational risk factors and loss events that cause fluctuations in the target. The second approach disaggregates the targets into many sub-targets and evaluates the impact that factors and events have on these sub-targets.

TOP-DOWN RISK MODELS

Top-down models focus on aggregate measures of an organization's performance.

It involves the following steps:

- 1. Identifying target variable.
- 2. Identifying major external factors and events that influence the target variable.
- 3. Developing a model of the dependencies between the target and the risk factors and events.
- 4. Calculating operational risk as the variance in the target that is unexplained by the external factors or as the variance that is explained by some operational factor.

Simplicity and low resource requirements are major benefits of top-down approaches. Limitations are, in general, less relevant for operations managers because the source of the operational loss is not made explicit and is therefore not actionable. These models that estimate operational risk as a residual are always backward looking; it is difficult to extrapolate the results to the next period.

Stock Factor Models

Analysts can use the current market value of equity as a performance target if the business is publicly traded. This approach requires estimating the sensitivity of the stock's rate of return to different factor returns for estimating a stock's beta.

Stock-based approaches can be modeled quickly and inexpensively like all topdown approaches. This process is transparent and requires few assumptions about accounting conventions.

Income-based Models

Income-based models measure operational risk in an effective and inexpensive way, if the management's focus is relatively short-term and immediate and if the income statement protection is paramount, and also when historical earnings are available.

Similar to the stock based models, operational risk is assessed as a quantitative residual after the external factors like historical market, industry, and credit factors have been removed from the historical earning fluctuations.

These models are quick to construct and easily comparable assuming that historical data is available. These models incorporate diversification across business areas and as a result are easily used for capital allocation.

Expense-Based Models

These models are the simplest approach for identifying Operational risk, its measurement, and analysis. These models associate operational risk with variations in historical expenses. Operating cost instability refers to the operational errors, fines, and losses that a business may incur during its operations. These are normally posted to the P&L accounts in the general ledger. The main benefits of these models are their ease and low cost. Focusing on operating costs the model overlooks the non-expense risks such as reputational risks, opportunity costs, or those losses that decrease revenues.

Operating Leverage Models

Operating leverage risk is the risk of a less-than-perfect match between revenue fluctuations and expense fluctuations. It depends on the size of the asset base relative to operating expense. Proxies for operating leverage are simple functions of the fixed assets and the operating expenses. Though an important component of operational risk, Operating leverage risk does not include many other aspects of operational risk like risk due to failure of internal controls etc.

Scenario Analysis

Scenario analysis gives us a qualitative technique for understanding the impact associated with major operational and business events and for developing emergency plans to respond. It builds a number of scenarios describing a particular combination of events that could occur in the future. Some of these scenarios describe that huge credit and market losses are external shocks, while some others describe Critical systems failure, major regulatory changes, loss of key people, or class legal actions as some of the internal shocks. The goal of Scenario Analysis is not prediction but prescription. It is useful when there is extreme uncertainty and lack of clarity.

Risk Profiling Models

Risk profiling models focus on tracking a handful of risk indicators that reflect process or system health. No attempt is made to link these factors to any target variable. Some of the measurements include: ratio of contractors to staff, supervisory ratio, down time, number of limit violations, number of temporary procedures, average years of staff experience, backlog levels, backlog of change requests etc.

If consistent measures are used, profiling models would be good for analyzing the evolution of operational risks over time, thus allowing the operations managers to deal with the problems before they get out of hand. The downside of profiling is the absence of a link between a target variable and the risk indicators that makes factors arbitrary. It also shifts focus onto the symptoms rather than the causes of the problems.

BOTTOM-UP RISK MODELS

These models begin with the basic elements of operations, such as assets and liabilities or processes and resources, and in a bottom-up fashion describe how potential changes to these elements could affect targets such as mark-to-market asset values and net income.

Several steps involved in designing a quantitative bottom-up model are:

- Identifying a target variable
- Identifying a critical set of processes and resources
- Mapping those processes and resources to a combination of risk factors and loss events for which historical data is gathered
- Stimulating the potential changes in risk factors and events over the time horizon
- Inferring from the mapped and the stimulated changes, the effect on the relevant target variables.

Bottom-up models are general in that they can be integrated with other models used for operational management. Asset-based models are often more accurate than other models but require more time and resources to develop. They require detailed data about specific losses that can affect the assets and liabilities in the organization. These rely heavily on the Pareto Principle. It follows that analysis should focus on the most critical assets and liabilities.

SELECTING A RISK MODEL

Various risk modeling techniques should be seen as complementary rather than as substitutes for one another. As systems and data have become more widely available, and managers have become more familiar with different techniques, some trends have become evident. A survey in 1999 suggests a dim progression from the trust on skilled audit staff towards more proactive, quantitative, bottomup models.

It helps to consider some common examples to understand better the bottom-up approach:

- Asset Liability Management: Traditional asset-liability management looks at projected future earnings in a number of financial scenarios. ALM approaches are most appropriate for those assets that are not marked to market.
- **Market Factor Models:** Knowing the distributions of factor returns for a short time horizon, the mapping between assets and risk factors, the initial value of the asset allows us to estimate the distribution of asset values in the forthcoming time period.
- Actuarial Loss Models: These models are used to estimate the random incidence of claims when an insured party suffers damages that are partially covered by an insurance contract.
- **Casual Models:** These models combine data about historical losses with subjective casual relations to produce estimates of conditional probabilities of one loss event, given that another has already occurred.
- Stress Tests: These are quantitative and shock the system to discover the impacts of the stresses. The key risk factors are stressed or given values beyond their normal operating ranges to reveal differences in processes and systems that might lead to unexpected errors.

Strengths

Top-down Models:

- Focus on cost management; are simple; and inexpensive to implement.
- Focus on long-term strategy involving great uncertainty or ambiguity.
- Use publicly available data.
- Are theoretically, simple to perform.

Bottom-up Models:

- Focus on balance-sheet protection, and are relatively accurate.
- Are long-term focused.
- Focus on market risk management.
- Are highly relevant to operations managers.

A hybrid approach combines the best of multiple methods. For instance, it incorporates:

- Factor models, which are used in income-based models.
- Loss events, which are used in asset-based models.
- Actuarial techniques, which are used in insurance actuarial models.
- Casually related events, which are used in casual models.

Source: Measuring and Managing Operational Risk in Financial Institutions, by Cristopha Marshall.

MAJOR SOURCES OF OPERATIONAL RISK

Risk is inherent in every business and is equally applicable to a small local area bank as it is to a giant public sector bank. In order to pursue business opportunities to earn returns for their owners, banks undertake risks. Therefore, operational risk emanates from the business processes, from people who carryout these processes, from the internal control systems that govern these operations, from the strategy adopted to carry out the business, from the environment in which the said business is carried out, etc. However, a deeper look at each of these elements is essential to build a resilient organization that can manage operational risk on a dynamic basis.

Business Process

The loss under this head arises more out of failure of business delivery process, breakdown or other disruptions in technology. The pre and post-stages of transaction process of every business activity undertaken by a bank are potential enough to cause losses. These processes can result in an error or fraud inflicting losses on the organization. Incorrect execution of a transaction could be due to the product-complexity or the incapacity of the people to execute the transaction or the failure of the Management Information System to capture the wrong processing of the transaction outside their delegated authority or beyond the boundaries of laid down policies and procedures. They may also arise solely on account of fraudulent intentions of the other party of the transaction that has incidentally gone unnoticed. At times, staff may also connive with outsiders in defrauding banks.





Source: GRK Murty, Operational Risk Management in Indian Banks: A Critique – IJBM – February, 2003.

People

People manning the banking transactions are potential enough to cause operational risk for they can intentionally or unintentionally cause losses by way of "employee-error" or misdeed etc. This potential is further accentuated by the way in which a bank manages its employees. Poorly trained or overworked employees may inadvertently expose a bank to operational risk.

An individual's disposition – inborn personality traits – help define whether someone is a risk taker or not. Generally, greed and fear are identified as the key drivers of behavior. Greed leads to a focus on big wins. Fear concentrates the mind on averting loss. And both the traits are potential enough to create problems to banks and in turn threaten their profitability.

Staff members' experiences relating to big gains and losses – particularly when they occur early in the career, shape their future orientation towards risk-taking. It shapes an employee's views on himself and his abilities, leading to misperceptions and superstitious thinking about oneself. This trait is glaringly visible in the traders' community of banks, who by these experiences may well consider themselves as skilled or lucky while those who lose money become more vigilant in looking for problems with the market or their colleagues. All this gets further flared-up owing to the kind of competitive stress that the bank staff are subjected to.

Management reward systems are also known to encourage bank staff, particularly the traders segment, to meet targets by taking a controlled amount of risk, cutting loss-making positions and repeating winning strategies. Sometimes behavior deviates from this pattern. Traders may, for example, set their own agenda and seek or avoid risks accordingly. When such self-drawn agenda is not in congruence with the organizational interests, employees are likely to create new risks to the bank.

Recent studies have reiterated that operational risks are embedded in human nature i.e., the kind of skills that employees bring to their workplaces. Research indicates that risk taking in any domain is influenced by a combination of general factors such as age, sex, desire to seek sensation, values, openness, etc of the people who are entrusted with the responsibility of managing the business. Risk behavior is mostly patterned – some are likely to be constant risk takers, while others are consistently risk averse, while a third group may have a domain specific pattern of risk behavior.

Most people take risk in order to reap some psychological or material benefit, not for the sake of the risk itself. People with high consciousness will perceive these benefits through disciplined striving rather than taking risks. People with low consciousness are often noticed attempting to secure quick results by taking chances rather than controlled effort, and in the process expose the bank to risk. Some people in their obsession for career progression, ambitiously pursue business targets with a myopic focus and in the process expose the organization unwittingly to greater risks.

The ethical profile of staff that describes one's diligence in exercising powers, tendency to transgress authority/violate norms, commitment to the institution's interest, ability to own up the responsibility, etc., also plays a great role in causing or averting operational risk. There are umpteen instances where people have flouted the delegation. The potential of an employee for such offences is defined by the individual risk propensity, competency and personality profile. A personal profile that is endowed with traits such as – extramarital affairs; drug, alcohol, or gambling addiction or debts; extraordinary medical expenses; regular travel and entertainment expenses of high proportions is known to predispose an individual to commit unethical practices, including committing frauds, besides clouding the individual's very thought process.

Operational Risk Management

It is interesting to recall what Emile Durkheim¹ once reasoned out: "Where a person's aspirations are balanced by opportunities, a state of contentment exists. On the contrary, he suggests that crime breeds in the gaps between opportunities and aspirations. Where aspirations cannot be fulfilled through legitimate opportunities, unconventional methods will be sought". This assertion concludes that people who are prone to committing frauds are endowed with characteristics such as being usually resentful of their employer organization, unfulfilled financial expectations, contributions are not properly recognized; have a basic disrespect not only for their superiors but also for their colleagues; have little or no respect for their employer's property; etc.

Ironically people prone to commit frauds are often perceived by the management as hard working while the perpetrators of fraud often believe their managers to be stupid, weak and amoral. Motivation, being influenced by external social forces, changes from time to time. That is one reason why a known honest man of today, turns a criminal the next day and having over stepped the line once, is likely to repeat the behavior. Although, the rapid changes in the structure of the society and in the structure of crime are known to run on parallel lines, it is very difficult to quantify the effect of social pressures on individual's motivation.

Secondly, the opportunity for an individual to defraud an organization depends on one's access to assets, systems and/or records of the organization; skills – higher the level of skills, higher the risk; right time – a fraudster selects the time and the place looking for weaknesses in the fraud-defense-mechanisms; and his rank in the organization that facilitates bypassing of controls and intimidation of subordinates so that, the irregular conduct of the employee is not reported to the top brass.

The skills that are very critical in defining an individual's style of discharging the assigned role from out of which operational risks are likely to emanate can be traced to three broad categories:

• Risk profile of a person –

Risk loving/averse,

Healthy, able to bear stress/easily burnt out,

Highly ambitious of achieving business targets,

Obsessive about career progress.

• Skill profile of a person –

Technical competency to carry out the assigned role,

Zeal for learning,

Grasp over the business-environment and client profile,

Managerial skills such as decision-making, sharing of knowledge, and training the subordinates.

• Ethical profile of a person –

Commitment to the institution's interest,

Diligence in exercising powers,

Ability to own the responsibility,

Tends to transgress authority/violate norms.

Any incongruence between an individual's risk-profile and the demands of a given role in the bank is potential-enough to cause operational risk.

^{1 &}quot;Forensic Accounting - How to investigate Financial Fraud", William T Thornhill, Synergy books international, Malaysia.

Internal Control Systems

Control is a process effected by the management to provide reasonable assurance to achieve the stated objectives with due diligence regarding reliability on financial reporting, effectiveness and efficiency of operations and compliance with applicable laws and regulations. The major components of internal control are: Control environment, risk assessment, control activities, communication about and monitoring of risk management, as operational risk can arise from any of these segments.

People who are supposed to carry on the business within the framework of prescribed control systems must be made fully aware of the risk involved in the business they are carrying out and its vulnerability to financial crimes, so that they can devote their attention to prevent it by undertaking appropriate measures. Financial crimes such as a fraud or rogue-trading being opportunistic in nature often arise when the systems and controls are operationally inadequate to arrest them. For example, a bank is susceptible to money laundering when its staff does not know the customer or has failed to implement the prescribed procedure in identifying the customer.

Control Environment

The basic elements of control environment that set the tone of a bank in influencing the control consciousness of its staff are:

- Integrity and ethical values,
- Commitment to competence,
- Human resource policies and practices,
- Assignment of authority and responsibility,
- Management philosophy and operating style,
- Participation of the audit committee and
- Organizational structure.

Any weak spot under these items is quite capable of impacting operational risk to the detriment of the bank.

Risk Assessment

It is often addressed by the internal audit system of a bank. Any failure on the part of the auditors can result in operational risk. Following are some such areas that call for constant vigilance -

- Changes in the operating environment,
- New personnel as unit heads,
- New information system,
- Rapid growth,
- New technology,
- Corporate restructuring,
- Regulating pronouncements.

Control Activities

At times the very rules and regulations introduced to arrest operational risk may ultimately result in the same. Some such areas are –

- Performance reviews reviewing the actual performance against the budget.
- Information processing controls that check accuracy, completeness and authorization of transactions.

- Physical controls activities that assure physical safety of assets and records.
- Segregation of duties authorization, record keeping and custody.
- Any top management slack in effectively using the information available through these control mechanisms, allows operational risk to go unnoticed and be managed in time.

Information and Communication: This involves methods and records established to record, process, summarize and report branch level transactions to top management. It also includes maintenance of accountability relating to assets and liabilities. Any let-up in executing acts such as the following can result in risk:

- Identifying and recording all valid transactions.
- Proper measurement of values,
- Recording in the proper time period,
- Presenting properly,
- Communicating responsibilities to employees.

Monitoring

It is meant for assessing the quality of internal control performance over time. It is an ongoing process that involves reporting by branches to top management from time to time or separate evaluation or a combination thereof by internal/external auditors. Traditionally, auditors assess the efficiency of management control and trigger enforcement activities to correct any deviations.

"Auditing" is the major internal control system that is used in banks to check compliance with the laid down procedures/policies and detect errors, if any, in the business processes carried out across the system that too well in-time before they grow into a catastrophe. One of the best practices internationally prevalent in the audit area is to use the best people in audit. In our context, this is perhaps still a far cry. Because even today, a post in the Inspection and Audit department is generally perceived by the staff as an end to their career progress. Such ill feelings would obviously reflect in the output of auditing. All this cumulatively raises the following questions:

- Are audit reports adding value?
- Audit reports are diagnostic test reports but the question is are they used as such? And the answer is obvious: Year after year audit reports are being closed with certain exemptions hoping that branches will rectify them in due course. However, they again find a place in the subsequent audit report and the exercise continues. To that extent, auditing and closure of audit reports have perhaps become an annual ritual.
- Is it not the job of auditors to unearth frauds and if so, how do frauds continue to occur even in branches where concurrent auditing is in force?
- Auditing of large credit, forex, investment portfolios, etc., calls for specialized knowledge and competencies in the respective field, but the question is, do auditors have such specialized skills? Suffice to say that so long as Inspection and Audit departments are treated as parking slots for inefficient people, internal control and supervision shall continue to suffer and in turn operational risk continues to haunt the banks.

Thus, monitoring is very critical in arresting operational risk at the branch level.

IT Systems

As technology has become all-pervasive in business, IT risks are becoming increasingly entangled with business risks. Technology changes quickly and continually provide new capabilities that banks want to take advantage of in their businesses. But new technology, as a general rule always remains a few steps ahead of the ability of the people to use it and therefore exposes a bank to risk.

Technology, people often say, is the automation of business processes that resolve, operating risk by eliminating the human error. But research reveals a contrarian perspective i.e., IT may not eliminate operational risk totally. "It is reported that the possibility of greater anonymity resulting from electronic or computer communication has reduced saboteurs' fears of being identified and getting caught. The consequence of anonymity is that those interpersonal deterrents that in the past fostered an employee's concern for "looking right" in front of co-workers are now rapidly disintegrating due to the greater number of interpersonal transactions that organizational members conduct electronically inflicting more financial losses".

Another example of operational risk emanating from IT systems is the absence of "visibility" in the system like in settlement; if there is a trade failure, exception management may not be available to enrich and overcome that failure. It may not be wrong to say that IT professionals in banks generally do not have the technical and managerial skills necessary to help banks shift from older technologies to new ones smoothly. They also lack skills to integrate technology with business. Any overreliance on technology experts is therefore likely to result in faulty investments or disruption in business processes that can result in "lost-opportunities."

Research studies indicate that computer-savvy people have a seemingly inbred dislike and disregard for authority. As they often work around problems, they like to find shortcuts to get a job done or a problem solved. In the process, they turn to be resentful of what they consider to be artificial barriers imposed by middle level managers who have very limited knowledge of the modern computer technology. This poses two threats: one, the tech-savvy juniors "look down" on their managers and even challenge their authority; and two, managers may fail to check the work of their subordinates in the area of computers, for that matter in any specialist areas.

Of late, Indian banks have started offering e-banking which is a Web-based service that enables the bank's authorized customers to log on to the banks website with the help of the bank issued identification and a Personal Identification Number (PIN). Internet, a public network of computers that facilitates free flow of the data/information with unrestricted access, if it is being used by banks as a medium for offering e-banking services, can introduce security risk into the business. It is important to understand that no bank is immune to security breaches that can damage its credibility, customer confidence, and ultimately its reputation.

The security concerns of e-banking emanate both from internal and external sources: Insecure passwords, disgruntled employees, viruses, inappropriate use of e-mail constitute internal security problems while, external risks are introduced by the Web or e-mail. Unauthorized access to a bank's critical information stores like accounting system, portfolio management system etc., could result in direct financial loss to the bank. For example, hackers could access, retrieve, and use confidential customer information or introduce virus. This can cause loss of data, tampering with customer information, etc., that are potential enough to damage the reputation of the bank besides creating legal implications by virtue of infringing customer's privacy. In the Internet environment, attempts at unauthorized access could emanate from any source and from anywhere in the world with or without criminal intent. Attackers could be hackers, unscrupulous vendors, disgruntled employees or even pure thrill-seekers.

Business Strategy

According to Chandler, "Strategy can be defined as the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals..." Learned et al., defined strategy as "the pattern of objectives, purposes, or goals, and major policies and plans for achieving these goals, stated in such a way as to define what business the company is in or is to be in and what kind of company it is or is to be?..."

During the early 1990s, when capital market was said to be in boom, many banks floated mutual funds making tall promises like doubling or tripling of investments to their investors. No one bothered how these promises could be fulfilled if capital markets crash which had literally happened subsequently. Canara bank, Indian bank and State Bank of India are some of the banks that have suffered heavily by virtue of adopting a short-sighted strategy of not having a properly evaluated strategy beforehand.

Similarly, launching of a new product without a properly articulated strategy is likely to end-up in disaster. Any major change in business strategy usually requires a change in organizational structure as well as changes in the information and control systems, attitudes, training requirements of staff, etc. Unless these issues are properly addressed, there is every likelihood of banks suffering from operational risk. At times, the change management initiated by the CEO may itself inflict financial losses by virtue of alienating the operating staff from the proposed change for reasons galore. The strategies designed and put in operation may at times fail to deliver the intended returns resulting in lost opportunities. Such weak strategies may be due to lack of competency or poor leadership at the top.

Business Environment

The environment in which banking is carried out will have its own say on the operational risk. For example, it is reported that one of the reasons for poor loan recovery rate in the eastern parts of India is the prevailing poor law and order situation. Similarly, physical security to the assets of the banks is considered quite poor in states where the law and order situation is far from desirable. Natural disasters like recurring cyclones, floods, etc., also inflict losses on the system. Terrorist threats, strikes and the predisposition of people for civil-litigation also matter in operational risk.

Outsourcing

Today, banks are resorting to outsourcing some of their activities, particularly in the IT segment and this may in certain circumstances help reduce the operational risk faced by a bank. However, banks may lose control over the quality of performance of outsourced activities unless the contract is well drafted. Secondly, as a sequel to outsourcing, a bank may lose its ability to conduct them in-house, particularly if the staff with that vital expertise is lost. This may pose a serious threat to the continuity of its operations if the service providers fail to perform.

Rate of Change in the Business Environment

During the last ten years banks have found it necessary to embrace a program of almost constant change, encompassing downsizing, business process reengineering, new technology, mergers and acquisitions, outsourcing and so on. Experience has shown that an organizational exposure to operational risk tends to increase as the rate of change increases and individual change introduced interact with each other creating an impact at the level of the organization.

The rate of change can alter the risk profile of a bank and by doing so, catch the management and staff by surprise. Similarly, the increased mergers and acquisitions activity is also perceived to have increased the bank's overall exposure to operational risk. This increase is mostly felt during the postmerger period. In the case of merged units, operational risk has been traced to (Chris Frost, David Allen, James Porter and Philip Bloodworth, 2001):

- Reduced levels of appraisal management supervision including transaction volumes, with risk swamping the operational processes; and
- Changes to overall business relationships with increasing crossorganizational dependencies and the attempt to integrate working practices, systems and cultures that were not designed to work together.

MEASUREMENT OF OPERATIONAL RISK

To begin with, a bank has to understand its operational risk profile by first identifying the types of operational risk that it is exposed to. Operational risk usually spreads across the following:

- Nature of bank's customers, its products and activities, distribution/service delivery mechanisms, complexity and volumes of transactions.
- The design, implementation and operation of the processes used in the endto-end operating cycle for a bank's products and activities.
- Risk culture and human resource management practices.
- Business operating environment political, legal, socio-demographic, technological and economic factors; competition and market structure.

As operational risk emanates from internal operational performance factors, it has remained fuzzy, making risk quantification difficult. Hence, it is difficult to build a clear mathematical or statistical link between individual risk factors and the likelihood of a loss. At the same time, inadequate management of operational risk has potential adverse implications for all banks as it can affect their solvency, adequacy to discharge their obligations to the customers and their susceptibility to financial crime. As on date, it is an acknowledged fact that due to both data limitations and a lack of analysis tools, a number of operational risks cannot be measured accurately in quantitative terms. Hence, banks are resorting to the process of risk assessment in terms of "high, medium and low" rather than risk measurement.

The accumulated experience indicates that there are two broad categories of operational losses -

- Frequent, small operational losses that may result from human error, which are quite common to all businesses.
- Major operational risk losses resulting from actions beyond the delegated authority or outside the laid down procedures, as reported in the Madhavpura Case. They are of low probability but their impact could be very large.

The Basel Committee in the revised consultation paper on its proposal for operational risk capital requirements, to be introduced as part of the Revised Accord, suggested three possible approaches to the calculation of operational risk capital.

Operational Risk Management

Basic Approach

It uses a fixed percentage ("alpha") of gross revenue in a range of 17 - 20%.

Box 4: Basic Indicator Approach

The most basic approach allocates operational risk capital using a single indicator as a proxy for an institution's overall operational risk exposure. Gross income is proposed as the indicator, with each bank holding capital for operational risk equal to the amount of a fixed percentage, " α ", multiplied by its individual amount of gross income. The Basic Indicator Approach is easy to implement and universally applicable across banks to arrive at a charge for operational risk. Its simplicity, however, comes at the price of only limited responsiveness to firm-specific needs and characteristics. While the Basic Indicator Approach might be suitable for smaller banks with a simple range of business activities, the Committee expects internationally active banks and banks with significant operational risk to use a more sophisticated approach within the overall framework.

The current provisional estimate is that " α ", be set at around 30% of gross income. This figure needs to be treated with caution as it is calibrated on a limited amount of data. Also, it is based on the same proportion of capital (20%) for operational risk as the Standardized Approach and may need to be reviewed in the light of wider calibration. For instance, in order to provide an incentive to move towards more sophisticated approaches, it may be desirable to set " α " at a higher level, although alternative means of generating such an incentive are also available. For instance under Pillar 2 or by making the Standardized Approach the entry point for internationally active banks. It is also worth noting that a sample of internationally active banks has formed the basis of this calibration. As it is anticipated that the Basic Indicator Approach will mainly be used by smaller, domestic banks, a wider sample base may be more appropriate.

Source: Basel Committee on Banking Supervision, Consultative Document Operational Risk, Supporting Document to the New Basel Capital Accord Issued for comment by 31 May 2001, January 2001.

Standardized Approach

It is same as the Basic Approach, but fixes different percentages for different types of businesses such as retail banking, asset management, etc.

Box 5: Standardized Approach

The Standardized Approach represents a further refinement along the evolutionary spectrum of approaches for operational risk capital. This approach differs from the Basic Indicator Approach in that a bank's activities are divided into a number of standardized business units and business lines. Thus, the Standardized Approach is better able to reflect the differing risk profiles across banks as reflected by their broad business activities. However, like the Basic Indicator Approach, the capital charge would continue to be standardised by the supervisor.

The proposed business units and business lines of the Standardized Approach mirror those developed by an industry initiative to collect internal loss data in a consistent manner. Working with the industry, regulators will specify in greater detail which business lines and activities correspond to the categories of this framework, enabling each bank to map its structure into the regulatory framework.

It is needed to ensure that businesses are slotted into the appropriate broad categories to avoid distortions and the potential for arbitrage. Within each business line, regulators have specified a broad indicator that is intended to reflect the size or volume of a bank's activity in this area. The indicator is intended to serve as a rough proxy for the amount of operational risk within each of these business lines.

Source: Basel Committee on Banking Supervision, Consultative Document Operational Risk, Supporting Document to the New Basel Capital Accord Issued for comment by 31 May 2001, January 2001.

Advanced Measurement Approach

Under this Approach, banks will be permitted to use their own internal model to calculate required capital. Banks are obviously, in a dilemma as to how to implement the "advanced model approach". The consultation paper has however identified three forms of models for estimating operational risk viz., Internal Modeling Approach, Loss Distribution Approach, Score Card Approach.

Box 6: Advanced Measurement Approaches

The AMA is the most risk sensitive of the approaches currently being developed for regulatory capital purposes. The Committee has developed the concept of Advanced Measurement Approaches in recognition that a variety of potentially credible approaches to quantifying operational risk are currently being developed by banking institutions and that the regulatory regime should not stifle innovation at this critical point in the development process. The regulatory capital requirement for operational risk under the AMA would be based on an estimate of operational risk derived from a bank's internal risk measurement system. This risk estimate would be subject to a floor based on the Standardised Approach capital charge for operational risk.

Thus, under the AMA, banks would be allowed to use the output of their internal operational risk measurement systems, subject to qualitative and quantitative standards set by the Committee. In many regards, this structure - the use of internally generated risk estimates subject to qualitative and quantitative standards - mirror the structure of the internal models Under the AMA, operational risk capital charges would be subject to a floor based on the Standardised Approach capital charges for operational risk. Initially, this floor would be fairly stringent, reflecting the fact that the internal methods used to quantify operational risk are still in early stages of implementation and that the AMA do not, as yet, contain detailed criteria for the specific quantification methods likely to be used by banks. It is proposed that the floor be set at 75% of the Standardised Approach capital charge. However, the intention would be for the Committee to revisit developments in this area on a regular basis - perhaps every two years commencing from the release of the final revisions to the Accord. With the intention of identifying those measurement approaches that have been developed most rigorously by the banking industry more detailed qualitative and quantitative standards could be developed based on the emergence of sound industry practices in areas such as measurement and validation techniques. The floor could be lowered, and eventually eliminated, for approaches meeting these more detailed standards.

A key purpose of incorporating the AMA concept as one of the methods under Pillar 1 is to allow the development of a range of nascent capital assessment techniques. The Committee would however be interested to gauge which of the current range of techniques is most likely to be developed by a critical mass of banks in the foreseeable future, and allow focus to be given to its work over the coming months and years. In order to assist in this process, the committee is setting out its current understanding of the range of possible approaches under an AMA type framework.

Source: Basel Committee on Banking Supervision Working Paper on the Regulatory Treatment of Operational Risk, September 2001.

Internal Modeling Approach

Under this method the expected losses in each business line are calculated by examining the average of past losses experienced, and then multiplied by a standard "gama" factor to derive a figure for unexpected or worst case losses which give the capital requirement.
Box 7: Internal Modeling/Measurement Approach

The Internal Measurement Approach provides discretion to individual banks on the use of internal loss data, while the method to calculate the required capital is uniformly set by supervisors. In implementing this approach, supervisors would impose quantitative and qualitative standards to ensure the integrity of the measurement approach, data quality, and the adequacy of the internal control environment. The Committee believes that, as the Internal Measurement Approach will give banks incentives to collect internal loss data step by step, this approach is positioned as a critical step along the evolutionary path that leads banks to the most sophisticated approaches. However, the Committee also recognises that the industry is still in a stage of developing data necessary to implement this approach. Currently, there is not sufficient data at the industry level or in a sufficient range of individual institutions to calibrate the capital charge under this approach. The Committee is laying out, in some detail, the elements of this part of the approach and the key issues that need to be resolved. In particular, in order for this approach to be acceptable, the Committee will have to be satisfied that a critical mass of institutions have been able, individually and at an industry level, to assemble adequate data over a number of years to make the approach workable.

Source: Basel Committee on Banking Supervision, Consultative Document Operational Risk, Supporting Document to the New Basel Capital Accord Issued for comment by 31 May 2001, January 2001.

Loss Distribution Approach

As in the case of VaR, this method attempts to fit a statistical distribution of the historical losses and derives the capital requirement from a confidence level on this distribution.

Box 8: Loss Distribution Approach (LDA)

Under the Loss Distribution Approach, the bank estimates, for each business line/risk type cell, the probability distribution functions of the single event impact and the event frequency for the next (one) year using its internal data, and computes the probability distribution function of the cumulative operational loss. The capital charge is based on the simple sum of the operational risk VaR for each business line/risk type cell. Correlation effects across the cells are not considered in this approach. The loss distribution approach has the potential advantages of increased risk sensitivity. This method differs from the Internal Measurement Approach in two important respects. It aims to assess unexpected losses directly and not via an assumption about the relationship between expected loss and unexpected loss, and the structure of business lines and risk types is determined by the bank itself. There is no need for the supervisor to determine a multiplication (gamma) factor under this approach.

At present, several kinds of measurement methods are being developed and no industry standard has yet emerged. In this circumstance, basing the capital charge on the bank's own methodology will cause comparability problems because the outcome may differ depending on the method used. Further, it is not clear that many banks yet have the data or methodology to perform the necessary estimations. However, by accepting only those measurement methods that attain a certain level of robustness, over time, it may be possible to establish a set of standards on the basis of which supervisors can secure the overall prudence of the capital framework.

Source: Basel Committee on Banking Supervision, Consultative Document Operational Risk, Supporting Document to the New Basel Capital Accord Issued for comment by 31 May 2001, January 2001.

Scorecard Approach

Under this method banks start estimating historical loss data as in the previous two methods, but also takes into consideration the future risks such as staff turnover and the qualitative assessments of the banks' control environment.

Box 9: Scorecard Approaches

In this approach, banks determine an initial level of operational risk capital at the firm or business line level, and then modify these amounts over time on the basis of scorecards. These scorecards are intended to bring a forward-looking component to the capital calculations, that is, to reflect improvements in the risk control environment that will reduce both the frequency and severity of future operational risk losses. The scorecards may be based on actual measures of risk, but more usually identify a number of indicators as proxies for particular risk types within business units/lines. The scorecard will normally be completed by line personnel at regular intervals, often annually, and subject to review by a central risk function.

In order to qualify for the AMA, a scorecard approach must have a sound quantitative basis, with the overall size of the capital charge being based on a rigorous analysis of internal and external loss data. In some cases, scorecard approaches are based on initial estimation methods that are similar to those used in internal measurement or loss distribution approaches. Where the scorecard approach differs from these approaches is that it relies less exclusively on historical loss data in determining capital amounts. Instead, once the size of the capital charge has been determined, its overall size and its allocation across business lines may be modified on a qualitative basis. Nevertheless, historical loss data must be used to validate the results of scorecards, with adjustments to capital size or allocation based upon such results.

At present, a range of scorecard approaches are in development with some banks already operating a system of economic capital allocation based on such an approach. However, as with the other approaches, no industry standard has emerged.

Source: Basel Committee on banking supervision. Working Paper on the regulatory treatment of operational risk, 2001.

Amongst the three models, globally, the scorecard approach is perceived as an attractive approach, for, it offers the following advantages:

- It provides a more complete and accurate measure of operational risks, by incorporating forward-looking risk indicators and qualitative assessments of the control environment as well as loss data.
- It gives managers much stronger incentives to reduce risks, and much better tools to help them identify how to do so.
- It is much easier to implement and also easier to adapt as the requirements of the bank and the regulators, evolve over time.

The Internal Modeling and Loss Distribution approaches have two major defects (James Ward, PA Consulting Group, 2001): they fail to take account of loss types that have not yet occurred and secondly, they fail to adapt to recent changes in the risk environment that have altered the probability or likely impact of events. As against this, the scorecard approach captures these two issues by focusing on general risk classes and on the risk factors that are internal and external to the bank, that drive the probability of these risks. There is however an element of "subjectivity" under the scorecard approach in assigning weightage to each item.

That being the fuzziness of operational risk measurement, it is too early to build up a formal statistical relationship between operational risk drivers and losses and hence, one has to intuitively make a good decision for the time-being and with enriching experiences build up better statistical models later.

MANAGEMENT OF OPERATIONAL RISK

Customer satisfaction in banks has assumed the status of key "differentiator", separating them from the competitors. Operational Risk management can play a vital role in ensuring that managers systematically improve customer service by exercising strict rein over operations and service delivery.

The senior management has to take over the responsibility of creating awareness about operational risk management and ensure that it permeates the whole organization through effective communication channels. It has to build a resilient organization with clearly defined management models and objectives. The internal audit reports and other regular communication to the top management must be able to provide adequate information on branch-wide efforts in managing risk.

It is universally agreed that besides the active participation of the top management from the corporate office in operational risk management, the primary responsibility of operational risk management must emanate from the business unit i.e., branches. Secondly, highly experienced staff must be inducted into the operational risk management department. The third requirement is to assign the responsibility of overseeing the operational risk management function to a senior General Manager. He shall be made accountable for its organizational wide implementation. The fourth important requirement is to develop specific operational risk management policies, for they alone help establish a framework within which operational risk can be measured, monitored, controlled, and reported. The overall guidance for establishing operational risk management culture and monitoring its enterprise wide management has to be directly under the supervision of board of directors.

A formal structure of Operational Risk Committee on the following lines would be appropriate.



Figure 2: Operational Risk Committee

Source: Operational Risk: the next frontier, 1999.

The operational risk committee shall be entrusted with the responsibility of -

- Determining operational risk policies and definition,
- Assessing cross-enterprise risks,
- Assessing both qualitative and quantitative benefits,
- Establishing linkages of operational risk to credit and market risk,
- Administering self assessment and roll out other tools.

Once established, the committee may design risk management practices on the agreed lines and ensure that they are implemented effectively through a meaningful follow-up.

Process (Operational Delivery) Management

A key aspect of operational risk management is to ensure the smooth continuity of business operations and service delivery; it is nothing but a bank's ability to perform business processes on an ongoing basis. The success or failure to maintain operational continuity without break-up shall therefore be aimed at from a perspective of capacity management, service management, sourcing of funds management, crisis management, human resource management, etc. Effective capacity planning process involves:

- Maintenance of correct level of internal and external resources to meet and support business needs.
- Optimization of resources so that business objectives are met with minimal cost.
- Building up of appropriate level of consistency, reliability and predictability in operations.
- Developing benchmarks for comparing the performance of existing processes with other similar processes, business units or competitors.

Services Management

It is essential for the branches to achieve and maintain "best in class" service delivery levels with processes that are reliable, less costly more efficient than those of the competitors. Recently, many of the top financial firms are moving away from risk-taking to more focused business and fee-based services to generate low-risk income with high return on equity. But, there are certain businesses such as custody, trust, asset management etc., which are low on market or credit risk but high in operational risk. This calls for a sound operational framework to make it quite resilient.

There is however, a direct relationship between capacity management and operational resilience, but over-stretching operations could result in increased operational risks, as the staff may be stressed, demoralized and hence more prone to commit mistakes. If a branch is not built to handle increased output, it would be more prone to operational risks.

Banks have to develop appropriate capacities, planning processes so that the business can meet demands placed on the branch by growth, peak demand periods or unexpected changes in demand. The capacity planning process must result in –

- Availability of correct level of internal and external resources at branches to meet and support business needs,
- Management of operational risks at an acceptable level,
- Optimization of resources so that business objectives are achieved with minimal cost,
- Appropriate level of consistency, reliability, predictability of the operations,
- Flexibility to affect changes in the business without interruptions.

People Management

Inappropriate management of human resources may affect both a bank's and its customer's vulnerability to operational losses. It should therefore establish and maintain appropriate systems and controls to manage operational risks, which is likely to emanate from employees. Focus may be made on the following aspects:

- Bank's operational risk culture and any digression from established culture.
- Contingency plans to carry the work in the event of employee unavailability.
- Ensuring that employees are aware of their responsibilities and role in operational risk management and that they are suitable and capable of performing these responsibilities.

- Segregation of duties, rotation of duties and supervision of employees in the performance of their responsibilities.
- Availability of systems and procedures manuals for the usage of employees.
- Training that enables employees to attain and maintain appropriate competence.
- Review of the fitness and propriety of employees particularly their honesty, integrity and reputation, competence and capability, and financial soundness, at regular intervals and deploy them based on the review findings.
- Performance related remuneration and scope for its increasing operational risk.
- Compliance with regulatory requirements pertaining to employees' welfare.

Taking a cue from the recent research findings, banks must strive to map the riskpotential of its staff from time to time based on their behavioural-exhibits both within and outside the organizational context, and constantly evaluate their riskpotential as it helps the management in picking right people for right job. Any incongruence between an individual's risk-profile and the demands of a given role in the bank is potential enough to cause operational risk.

Successful operational risk management relating to human resources is more an art than science. As against the philosophy of modern management theory, which believes that majority of people want to work, take pride in their work, prefer to take part in decision-making process and help find creative solutions to problems at the work place, provided an opportunity is given (Heny K S Daryanto and Arief Daryanto), whenever a reference is made to risk control, banks always refer to command and control systems which implies that the employer does not trust the employees. This appears to be obvious, for, the bank staff, influenced by powerful human emotions such as fear and greed, is prone to err as witnessed in the case of Nick Leeson, causing operational losses. Perhaps harder controls at all levels are needed to successfully manage operational risk.

Managing Systems and Controls

Auditing is one of the major tools used by banks to ensure control over operations across the organization. Management must therefore use auditing as a powerful ally and rich source of insight and information to know how the compliance is being effected at all work places and to evaluate the "tone-up" needed, to make it effective dynamically. From an operational risk management perspective, audit reports needed to be necessarily analyzed critically as they provide "early warning signals of potential danger".

But the reality in the Indian banking system being what it is, there is a paramount need for both the management and the managed to change their disposition towards audit to ensure that evolving risks are nipped at the budding stage itself. But the use of internal audit report as a prime source of management of operational risks becomes feasible if only there is a -

- Closer integration of audit with business, which today is abysmally low.
- Greater recognition, importance and impact of internal audit in arresting operational risk.
- Availability of early warning signals to top management for correcting the situations.
- Senior management follow up as a clear message to the operating staff.

This ensures immediate remedy all audit-related problem raised, which in turn improves the effectiveness of systems and controls in arresting operational risk.

It is also necessary to maintain appropriate systems and controls to ensure that no operational risk arises from inadequacies or failures in the delivery process or systems and hence, following issues need to be taken care of.

- Processes and systems used in the end-to-end operational cycle to deliver the services should be properly integrated.
- Processes must enable the bank to comply with regulatory and statutory requirement.
- Stand by arrangements to maintain continuity of operations.
- Put in place indicators that identify system risk and thereby enable the management to rectify and replace them well in time.

New Product Review Process

It is often noticed that banks launch new products without assessing the modification, if any, needed in the delivery process or training needs of staff, etc., for its effective delivery and in the process end-up in losses. It is essential to put in place a system of review so that risk management group evaluates new products/services/processes before they are launched. This is to ensure that necessary prophylactic measures can be designed and communicated to operating units so that the proposed product/modification in the delivery processes, etc., are handled with due diligence.

IT Systems Management

It is true that automation of delivery process to a great extent reduces a bank's susceptibility to certain "people's-risk" such as reduction in human errors, segregation of duties, information security. At the same time it also increases a bank's dependency on the reliability of IT systems chosen. It therefore necessitates establishment and maintenance of appropriate controls to manage IT systems-related risk. To accomplish this task, the management must focus on:

- Organization and reporting structure of technology operations,
- Overseeing by the top management,
- Technology requirements and their inclusion in the business strategy,
- Appropriateness of acquired IT systems,
- Maintenance support for hardware and software,
- Appropriateness of allocation of duties under IT operations,
- Maintenance of an internal documentation of processes and systems.

Information about the systems, their handling, problems faced in handling the technology, innovations that have been applied to overcome such glitches, etc., may exist in many places and forms – physical, electronic or known to employees but not recorded, etc. It needs to be collated at a central place and made available to everyone to be used in managing day-to-day problems. The safe-keep of such knowledge calls for –

Confidentiality: Information is made available only to an authorized person.

Integrity: Safeguarding the accuracy and completeness of information being processed.

Availability: Only an authorized person or system is granted access.

Authentication: The identity of a person processing the information must be verified.

Non-repudiation and Accountability: A system must be put in operation that ensures that the person processing the information cannot deny his action.

The operation of processes and systems may have to be necessarily different to be in alignment with the needs of different geographic locations. Accordingly, a bank's operational risk profile gets altered. Similarly, when a bank has operations in different countries, its risk profile obviously differs from center to center. This needs to be taken cognizance of while drafting the risk management procedure.

Change Management

During the times of significant changes in the organizational set-up, infrastructure and business operating environment, a bank's exposure to operational risk is likely to increase owing to -

- Untrained or demotivated employees or significant loss of employees.
- Undertaking a new business activity or the modification of existing activities.
- Inadequate human resources to carry out routine business activities owing to the prioritization of resources to undertake new business etc.
- Changes in regulatory and legal requirements.
- Process or system instability while catering to the increased demand.
- Inadequate/inappropriate/untested processes following business reengineering.

This needs to be addressed on a different footing: Designing an appropriate reporting structure for managing the change; assessing the adequacy or otherwise of the existing processes and systems to manage the change; and communicating the changes in the systems and controls, if any affected, to all the employees.

Disruptions to the continuity of a bank's operations do occur due to certain exogenous events resulting in loss of resources and failure of processes. In order to avoid such disruptions and maintain continuity of the business, a bank has to undertake measures such as succession planning, systems resilience, dual processing/alternate service providers, contingency arrangements, etc. Essentially, managing operational risks arising out of change in business environment is the prime responsibility of the top management.

Risk Monitoring

As a part of its risk management philosophy, the top management shall call for an appropriate report at regular intervals on the operational exposures, loss experience and authorized deviations from the bank's operational risk policy. They should also ensure to maintain the records of -

- Results of risk identification, measurements and monitoring activities.
- Action taken to control identified risks.
- Assessment of the effectiveness of the risk control tools that are used.
- Actual exposures against stated risk tolerance as defined by the assigned capital.

Operational Risk Policy

A bank should document its policy for managing operational risk. It should spell the strategy and objectives for operational risk management and the processes that it intends to use to achieve these objectives. The document should basically contain -

- Analysis of bank's operational risk profile.
- Risks that it is willing to accept and the risks that it is not prepared to accept.
- How it intends to identify, assess, monitor and control its operational risks.
- An overview of the people, processes and systems being used.
- Assessment of bank's risk exposure for allocating capital.

This not only facilitates a uniform approach towards operational risk management in the bank as a whole, but also functions as a benchmark to measure the performance of individual units under operational risk management.

Introducing Effective Risk Transfer Methods

Banks must be abreast of effective risk transfer methods such as insurance or Alternative Risk Transfer. Traditionally, complex technology risks, financial services' professional liability are all good examples of difficult-to-insure risks. But, in the western world, insurance companies are today offering a variety of products that cover a wide range of operational risks faced by banks. They have

been breaking down the whole gamut of operational risk into five components: Personnel covering adverse impact of improper personnel policies, internal fraud, etc., technology covering the risk of loss resulting from systems unavailability, poor data quality, system errors, or software problems; physical assets covering the risk of damage or loss of physical assets that negatively impact operations; relationships covering the risk of loss resulting from relationship issues such as sales practices, etc.; external covering the risk of loss from external fraud, and offering structured coverage (Roland Avery and Paul Milton., 2000). These facilities are of course not yet available for us. Yet, banks have to put an efficient system in force to at least avail the existing insurance coverage for all the risks that can be transferred to the insurers well in time and monitor for their timely renewals.

Knowledge Management

Banks have a wealth of history. Similarly each branch has its own reservoir of knowledge that can be used as a guide to present and future decision-making. From an operational risk management perspective, the key is to unearth this knowledge and find ways to use it to generate value. In the days of flat and less hierarchical structure, knowledge sharing and communication has gained importance. But it is a difficult resource to identify and manage. Effective linkage between knowledge management and risk management can be built by:

- Conducting training programs that inculcate the habit of open communication, knowledge sharing and problem solving among the branch level staff.
- Developing right environment for people to work together in teams at branches.
- Management should work towards making intangibles into tangibles by paying as much attention to branch level environment.
- Embedding communication and information processes in operational practice to create, transfer and store knowledge.

This enables branches to make use of the earlier experiences to fight out similar risks i.e., they need not reinvent the wheel once again.

SUMMARY

- The chapter discusses the divergence in the definition of operational risk to emphasize how it is still evolving.
- It also discusses identification of various sources of operational risk that could emerge in the pursuit of business opportunities.
- The limitations encountered in measuring operational risk are also highlighted.
- The need for intuitively assessing the potency of varied operational risks in inflecting losses to the banks has also been stressed.
- The essential role of the top management in managing operational risk through a well-designed operational risk management set-up and different avenues that need to be pursued to manage operational risk have been deliberated upon.
- In the ultimate analysis, it is the unit heads, which are to implement the operational risk management practices for achieving the desired results under the policy guidelines issued by the risk management committee.

Chapter VIII

Risk Management Framework in Banks

After reading this chapter, you will be conversant with:

- Enterprise-wide Risk Management in Banks
- Elements of Risk Management Framework
- Different Measures of Measuring Risks
- Involvement of the Management in the Risk Management Framework
- Systematic Risk Management in Banks

In the rapidly changing business environment, the need for identifying the inherent risks that faces the organization has become the order of the day. The present scenario demands more sophisticated and comprehensive controls in order to bring the products more quickly into the market. As a result of this, the concept has slowly graduated from the risk control paradigm towards a more "Risk Management" framework. As a basic trait, the process of risk management provides the organizations to control their risks, as well as measure the performances more effectively. Coupled with this, it has also aided in the determination of capital allocation as well as realization of a variety of other business advantages. As a result of this proactive initiative, an organization especially the ones that are faced with enhanced financial risks, can gain a competitive edge and also increase their business reputation. The ever-increasing amount of competitive and regulatory pressures has compelled various organizations to adopt enterprise-wide risk management framework. Those organizations that do not implement such a risk management framework may find it very difficult to cope with the fast changing financial risk environment.

THE ENTERPRISE RISK MANAGEMENT FRAMEWORK

Organizations invest in avenues whereby the investment is locked up in expectation of uncertain future cash flows. Such ventures also include the financial institutions as well. Such organizations have some predetermined goals that they are in pursuit of. As these goals are saddled with uncertainty, these organizations also face risk. Adopting a proper risk management framework in banks, actually aids in optimizing the process with which the various risks are taken. This process became a critical issue during the nineties as it was during this time that many of the world's biggest companies started suffering losses, the reason being lack of a proper risk management framework. Some of the examples can be cited as follows:

Orange County (November 1994)

The investment pool of Orange County lost to the extent of \$1.7 billion from structured notes and leveraged reposition. The treasurer, Robert Citron, took the positions from oversight from the county's five person board of supervisors. The risking of the pools investments was discussed publicly in later incidents, though the members of the board of supervisors claim that they did not receive critical information which have indicated the risks that Citron was taking.

Barings Bank (February 1995)

Barings Bank lost to the extent of \$1.5 billion because of a Singapore based trader Nick Leeson, who took unauthorized futures and option positions that were linked to the Nikkei 225 and Japanese Government Bonds (JGBs). At the climax of his activities, Leeson controlled 49% of the open interest at Nikkei 225, in March 1995, contract. Despite having to finance the margin calls as the bank lost money, the bank's board and the management claim to have been unaware of Leeson's activities.

Daiwa Bank (September 1996)

In the Daiwa bank case, one of the bank's US based bond traders, Toshihide Iguchi, concealed \$1.1 billion losses over a ten year period. When the management learned of the losses later, they tried to conceal them from the regulators. Eventually the bank was compelled to shut down all its operations in the US and it came to a \$340 million plea agreement with the US prosecutors.

Sumitomo Corporation (June 1996)

The company's chief copper trader, Yasuo Hamanaka, disguised losses that totaled \$1.8 billion over a period of ten years. During that period, he carried on nearly \$20 billion of unauthorized trades each year. He was successful in concealing his activities because he headed his section and had trade confirmations sent directly to him.

In recent times, there have been numerous organizations that have suffered staggering losses such as these. The ones that are discussed above are some of the most significant ones. The losses that these companies incurred feature a couple of common characteristics. They are:

- The losses they incurred were due to the actions taken by individual people.
- These losses could have been mitigated, if not avoided had there been a proper risk management framework in place.

The losses such as these never used to occur to such an extent prior to this period. In the past, organizations that went into bankruptcy suffered due to reasons that were microscopic such as competition, mismanagement or adverse conditions. But today, any individual can deal in billions of dollars. There has been a marked change in the scenario.

It should be always kept in mind that the risk in any financial institution, does not arise alone from a derivative instrument. It actually arises from many sources of leverage that are available in today's market. Apart from the derivatives they also include the repos, securities lending and the structured notes. Such tools have increased the liquidity in the markets and enabled the institutions to efficiently manage many of their risk exposures. The problem that lies is actually not with the tools, but rather with the people who use them.

Previously the risks were unleveraged, as a result of which, trading losses were limited. This would have cost a few individuals their careers, but at the same time they would have rarely made it to the newspaper headlines. Today, the same type of risk is taken by many traders but they are hedged through leverage. The importance of leverage not only lies in increasing the market risk of the organization, but also in enhancing the other types of risks, that includes the credit risk, liquidity risk, operational risk and legal risk. Today all organizations are focusing on these kinds of risks. Through a holistic risk management framework, they are not only trying to seek comprehensive solutions, but are also beginning to realize that the consequences of these risks have become enormous. The various regulators are also trying to motivate the process of change. Realizing the threat of the leveraged risk, they are trying to pursue measures that try to:

- Increase the disclosure of balance sheet risks.
- Promote corporate risk management framework.
- Ensure that the various institutions are sufficiently capitalized for the different types of risks that they are taking.
- Mitigate the undiversifiable risk.

It can be said that the financial institutions, especially the banks, are focusing on this holistic risk management framework because it makes good business sense. As a result of this changing attitude towards risk taking, there has also been a change in the risk management process. Organizations are now implementing innovative methods, installing latest technologies, and actively reshaping their corporate cultures so as to facilitate a better risk taking arrangement.

Executing an effective risk management strategy is not an easy task. Different organizations with their individual features refer different approaches and this adds to the level of difficulty. There are, of course, a few fundamental pillars that necessitate a well defined risk management framework in any bank, namely, the corporate culture, different procedures and the technology aspect of the company. The importance of each of these components will in turn depend upon the needs of the organization and their respective priorities. At the same time, it is to be kept in mind that each of these factors will impact upon the organization's risk taking ability. The details of each of these elements are provided hereunder.

The Corporate Culture

In the context of those corporate houses that suffered enormous losses that resulted from the incidents of adverse market movements, the fundamental problem that lay with each of these companies was mainly cultural. Each of these institutions possessed a corporate culture that proved to be incapable of coping with irresponsible behavior. It is to be considered that any organization will reduce risk only if its members try to manage those risks. Regulators find it very difficult to manage these institutions. They can force to implement a savvy value at risk framework, they can also appoint a committee to implement hundreds of pages of procedures, but above all it boils down to those members and their foresight about taking and managing the risks. They cannot force the institutions to manage risk. It is individuals who decide whether or not they are going to manage organizational risk. In essence, a positive corporate culture defines what behavior the members of the organization will portray and what behavior they will not comply with. The corporate culture plays a crucial role in the process of risk management because it defines the risk that the individuals must personally take if they are going to help in managing the organization. A few of the characteristics of a positive risk culture primarily revolve around the following factors:

- The proper decision-making of the individuals,
- Posing questions to the individuals,
- Confession of ignorance.

Procedures within the Organization

Procedures form an important part of risk management framework within a bank. The very purpose of procedures is to empower people. The success of any procedure depends critically upon a positive risk culture. It is not important that any procedure should consist of hundreds of pages. Even a very simple set of procedures can make a difference in the company if people believe in them and take personal responsibility for upholding them. The proper existence of procedures aid in systematizing the process of risk management. They try to make demarcations of how much risk is too much risk for any given segment of portfolio. Whenever there is lack of procedures, there is always the chance of increased potential for disagreement. Lack of procedures enhances the personal risk that individuals must take if they are going to manage the organizational risk. On the other hand, the very existence of proper procedures empowers the people. They determine specifically, what people should do, and what they should not do, in any particular situation. Thus by migrating the level of uncertainty as well as individual risk, they try to promote action. The most common types of procedures include board procedures, lines of reporting, trading authority, and risk limits. It is also important to have procedures that are regularly updated. There are certain informal practices that slowly evolve out of habit instead of deliberate processes. For the reason that they may be adopted due to necessity or convenience without even considering how they impact the risk that the organization faces, in course of time, they too may become a source of risk.

The Technology Perspective

For several institutions, especially the banks, insurance houses and other investment management houses, technology plays a critical role in the risk management framework. For the other organizations, especially those that do not manage the assets internally, the role of technology is less. On the other hand, those institutions that rely heavily on technology, there always lies the risk of technology becoming the center point of risk management. A more organized framework of risk management recognizes that the process of risk management is primarily about the people within the organization and how they perceive and how they interact with one another. Technology can just be considered to be a tool.

A comprehensive way of implementing a proper risk management framework in banks is:

- In the initial process, allocating a minimal funding for the initiatives, but at the same time ensuring that the board members, senior management and other supervisors are actively involved in the process.
- Initiation of a risk management strategy that does not consist any technology at all. This exercise primarily focuses on the procedural as well as the cultural issues of the risk management framework.
- Once the proper strategy is determined for the purpose of managing risk, it becomes important to realise the technology needs that are to be incorporated and how it can have a positive effect on the strategy.

Compilation of Data

One of the most essential elements of risk management framework is information. Before any information can be processed, analysed or acted upon, it is important that it is available to the systems and the individuals that really need them. In the context of the great institutional losses, such as the orange county, Barings brothers, Daiwa bank and Sumitomo Corporation, each of the losses could have been prevented if the decision makers had the proper information. Out of the stated four cases, three occurred due to the involvement of falsification of information. Even, in the absence of fraud or human error, data management has always been a bottleneck of risk management framework within a bank. Managing risks such as an organizations total yield exposures, or its total credit exposures to the counter party are impossible without comprehensive information about those exposures. The problem posed by credit exposure is almost the same. Exposures to a single counterparty can arise throughout an institution.

Before any organization can implement a proper risk management framework, it is essential that it first collects and communicates all the necessary information that is related to the risk. Traditionally, organizations had only limited ability to do this. They had faced too many different as well as complex risks. The risk management professionals did not have any convenient means of communicating the exposures across the various levels of the organization.

Let us consider here the simple case of a bank, where there are just a couple of trading desks. In order that these two desks co-operate with each other in managing the risks, they need a one line communication between them. Now suppose that the bank has more than two desks, in such a case the line of communication would grow from one to many. In order to manage the risks across these lines would become a herculean task. This sort of problem in the past was mainly due to the lack of proper risk management framework within the banks. Earlier, each of the desks would be given a broad authority to manage the risks that resulted from its own operations. Today, the existence of technology has made it possible to effectively communicate information, be it across the desks or across the various departments. This technology solution is a result of data aggregation. It is to be noted here that the process of data aggregation is not a new concept. Various corporations have been trying to aggregate the data since they realised their importance. Today they are reaping the benefits out of it.

Analysis of Risk

While considering the various risks within the organization, it was a practice to look into the numbers in the profit and loss statements and find proper solutions to the question of how much risk the company is exposed to. There was no gainsaying the fact that volatile profits meant high risk. But the problem that remained inherent in the system is that, profit and loss is a retrospective measure of risk. It is a well known fact that the Barings bank was taking a high amount of

risk in February, 1995. This fact was realized too late to avoid the huge loss that the company suffered. As a matter of fact, the profit and loss statement may not reveal any or may reveal very less of the many risks that an organization faces. A specific type of credit loss may have an impact on the profit and loss several years after the actual exposure is taken. Further the profit and loss statement may provide no indication about the existing liquidity risk. Though this type of risk tends to strike infrequently, but nevertheless with devastating effect. In order to manage these kinds of risks, the different organizations should be in a position to measure these risks perceptively. It is important for them to know that based on their current positions, how much risk they are actually taking. Though the process of data aggregation does not solve this problem altogether, but a list of contracts and counterparties may tell where the risk is lying.

Various organizations are trying to address this challenge with statistical risk measures. For measuring market risk, they are using the Value at Risk (VaR), for the purpose of measuring credit exposure, the expected exposure or the maximum exposure is used. Such measures of risks provide a powerful tool as they can bring down the complete risk within the framework of a single number. Say for example, the Value at Risk incorporates, all of a portfolio's holdings as well as the volatilities and correlations of the applicable risk factors. As the measure of VaR is based in the current holdings of the portfolio, it is a prospective measure of risk. It tells the person the level of risk he is taking. Coupled with this, as this measure takes into account all the market volatilities as well as the correlations, it captures all the hedging and diversifiable effects.

The statistical measure for credit risk exposure is similar. The potential credit risk is summarized based on the existing portfolio of contracts with counterparty. It also takes into account the market volatilities as well the correlations. One of the major drawbacks of these statistical measures of risk is that they are highly computer sensitive. As a result of this nowadays more and more companies are focusing on the computer systems.

SYSTEMATIC RISK MANAGEMENT IN BANKS

With enormous mounting of competitive pressure, the effective and efficient management of risk has become a core competency of any successful bank. Optimal risk management is now more of a strategic decisive factor in banking. Classic cases of huge losses have compelled the regulatory authorities to increase the demand they place on the bank's risk management. The balanced integration of the regulatory authorities in the internal risk management of the banks, assures that the bank is complying with the regulatory norms. During the past decade, throughout the world, the banking industry has strived hard in the area of risk management and it has achieved success to a great extent. At the same time, the regulatory requirement has been made more stringent both at the national as well as the international level. The development of risk management in banks has so far been viewed in isolation in the individual business areas of banks and has therefore been relatively less uncoordinated. In the limited areas, the quick availability of the solutions was given priority as compared to the systematic and overall concepts. Today, the scenario has changed; banks are now putting their efforts that are aimed towards embedding the bank's risk management into a more structured framework that takes into account the overall concept. The relevant regulatory standards also require a structured approach.

In common parlance, risk management calls for the establishment of an organizational framework for handling the different kinds of risks. The various kinds of processes, instruments, recourses and the responsibilities that are required to ensure a systematic and efficient risk management system needs to be clearly defined and anchored into the framework.

Risk Management Framework in Banks

Risk management requires a sound understanding of the bank's operational environment, the risks to which it is exposed and the techniques available to measure and manage these. This in itself cannot ensure the attainment of operational objectives. Risk management is also affected by the infrastructure put in place to implement the chosen risk management framework. There are many different elements to this infrastructure, including organization, management, procedures and controls, all of which have an impact on the effectiveness of the implemented framework. One of the key factors is the effectiveness of the risk management system, whether an integrated treasury and risk management system or a specialist risk engine.

It is the Systematic risk, which is company-specific and cannot be diversified by holding a diverse portfolio of stocks. The benefits available from Systematic risk management are:

- 1. Expectations are more realistic;
- 2. Provides a systematic view of the situation;
- 3. Decisions can account for all available information;
- 4. Assumptions are explicitly identified;
- 5. Decisions can be consistent with overall project goals;
- 6. Contingency plans are available for faster and better reactions;
- 7. Potential opportunities can be identified and exploited.

THE BASIC FRAMEWORK

A common risk management framework consists of the following elements:

Management of Interest Rate Risk

There are a number of different risk measures that can be used for the measurement and management of interest rate risk. Each of them has advantages and disadvantages from an operational perspective, and each can be implemented in different ways by the systems supporting them, with a consequent impact on the effectiveness of the risk measure and of the system.

Duration-Based Measures

Perhaps the most commonly used measures in the banking sector are the durationbased measures. These measures have a number of advantages and disadvantages in terms of their implementation and use. Probably their chief advantages are that they are independent of the size of the underlying position, and that they are easy to understand and to act upon. Size independence means that it is possible to compare immediately the relative risk of two portfolios or of the actual portfolio and the benchmark, regardless of the size of the two portfolios. It also means that any risk limits or guidelines denominated in these terms do not need to be revised every time there is a significant change in the size of a portfolio or position. The intuitive nature of these measures means that all levels of the organization understand the measures, know what changes in duration imply in terms of increased or reduced risk, know what actions need to be taken to increase or decrease the risk position being taken, and know what impact broad changes in interest rates will have on these risk measures.

One disadvantage of these measures relates to the fact that their size independence means that they do not give any real indication of the potential change in market value of the portfolio. Another limitation is that duration measures only make limited sense when applied to a portfolio containing assets denominated in more than one currency due to differentials in the level of interest rates for the different currencies involved. Systems supporting the duration measures generally do so in a reasonably consistent way for vanilla fixed income bonds and discount instruments. However, significant differences start to appear when the support

provided for more complex instruments, such as floating rate products, mortgage or index linked products and derivatives is examined. For these instruments there is no single, commonly accepted principle for calculating meaningful duration figures in a consistent manner or for combining the risks associated with these instruments into an overall duration figure for a position containing these instruments with other fixed income instruments.

Basis Point Value Type Measures

Another favored family of risk measures in the banking community is sensitivity measures based on the valuation impact of defined parallel shifts in interest rates (like basis point value). These measures are size dependent, offering some indication of the magnitude of potential gains or losses. They can also be reasonably consistent in their treatment of different instrument types, dependent on how the calculations are actually implemented. Finally, they make more sense when applied to positions containing more than one currency, particularly if the implementation allows some flexibility in defining the parameters of the calculation for each of the markets involved. Again, these measures are normally implemented in a reasonably consistent way for fixed income securities and money market instruments with known cash flows. It does, however, make sense to ensure that the way in which these measures are calculated is consistent with the valuation approach applied to the portfolio; else the measure of the risk being taken may not be consistent with the actual results achieved. Significant differences between systems really start to appear when these measures are applied to floating rate or index linked instruments, derivatives, or any other instrument where there is no fixed cash flow structure, or where the instrument includes some element of optionality (callable bonds, Mortgage-Backed Securities). In these cases, the systems calculations will be made based on a set of assumptions, and it would be prudent to ensure that the assumptions used were consistent with the bank's own view.

Value-at-Risk

Value-at-Risk type measures are increasing in popularity because they give an indication of the potential gains or losses in value that may occur. But VaR figures can be difficult to interpret for many people and tend to emphasize the exchange rate component of the risk associated with a portfolio when the bank has limited scope for action. Moreover, VaR does not give a direct indication of the actions that need to be taken in order to reduce risks. VaR figures can also be subject to bias, particularly as a result of the way in which the position is broken down into its component parts. Due to the high computational demands that VaR calculations place on systems, these figures may not be available in real time or may only support a limited level of analysis. VaR calculations are also sensitive to the quality of the input data, particularly correlation and volatility data.

Combinations of Measures

Many institutions use a number of different, complementary measures in their risk management framework. The risk measures used to determine limitations on the risks taken also need to be available in any limits component of the system, so that position limits can be put in place to control exposures. The systems infrastructure implemented in a bank should be driven by the interest rate risk measures that the bank wishes to use as a part of its risk management framework.

It is not enough to look for a system supporting a particular set of risk measures. The implementation of any particular risk measure can vary quite considerably between different systems, particularly when applied to the more complex instruments. It is, therefore, necessary to look also at the details of how the risk measures are calculated.

INTEREST RATE RISK MANAGEMENT PRACTICES

A proper risk management practice is essential for the prudent operation of banks and in promoting the stability in the financial system as a whole. The role of a board and the senior management can be enumerated as follows.

- For the purpose of carrying out its responsibilities, the Board of Directors in a bank should approve interest rate risk management policies and procedures and they should be informed regularly about the interest rate exposure in the bank.
- It is the duty of the senior management to ensure that the structure of the bank's business and the level of interest rate risk it takes on are effectively managed, and that appropriate policies and procedures are well established to control the limits of these risks.
- The bank should have a risk management function with clearly defined duties that are able to report the exposures of the risks directly to the senior management and the Board of Directors and are sufficiently independent from the business line of the bank. Those banks whose functions are larger and complex in nature should have units that are responsible for the design and the administration of the bank's interest rate risk management system.

A proper interest rate risk management practice calls for the application of four basic elements that mainly concern the assets, liabilities, and off balance sheet items. These elements are:

- Oversight by the board and the senior management,
- Proper risk management policies and procedures,
- Proper risk measurement and monitoring systems,
- A sound internal control and independent external audit.

Let us now try to discuss each of these in brief.

Oversight by the Board and the Senior Management

This is a critical factor for a sound interest rate risk management process. It is also important that these individuals are aware of their responsibilities with respect to interest rate risk management and they perform their roles effectively.

THE BOARD OF DIRECTORS

The Board of Directors have the primary responsibility for proper understanding of the nature and the level of interest rate risk that is taken by the bank. It is the responsibility of the board to approve the policies and strategies of the bank that govern their interest rate risk. It is also important for the board to review the overall objectives of the bank with regard to the interest rate risk. The board should also approve the policies and the procedures that identify the lines of authority and responsibility for the proper management of interest rate risk.

They are responsible for approving the overall policies of the bank with respect to the interest rate risk and also ensure that the management takes steps that are necessary to identify, measure, monitor and control the different kinds of risks. It is also the duty of the Board of Directors to encourage discussions between its members and the senior management. To look for those people who have adequate technical skills in managing different kinds of exposures is also the responsibility of the Board of Directors.

SENIOR MANAGEMENT

The responsibility of the senior management lies in ensuring that the bank is equipped with adequate policies and procedures for the purpose of managing interest rate risk on the long-term as well as day-to-day basis and that is able to maintain a clear line of authority and responsibility for managing and controlling this risk. It is the responsibility of the management to maintain:

- Proper limits of taking risks,
- Adequate systems and standards for the measurement of risks,

- A well managed framework for interest rate risk reporting and review,
- Effective and efficient internal controls.

The interest rate report that are provided to the Senior Management should provide total information as well as a structured supporting system that can access the sensitivity of the organization to the various changes in the existing market conditions as well as other inherent risk factors. The Senior Management is also expected to review the interest rate policies of the organization and ensure that things are in order. In the case of the large banks, they should be having a separate department that designs and administers the bank's interest rate risk management. The size and the realm of such department would be in accordance with the size and the structure of the bank and the complexity of the transactions and the commitments that it has towards its clients.

RISK LIMITATION OF A BANK

Any limitation cannot have its effect in a vacuum. Rather, it should be strictly in consonance to the risk capacity of a bank. The term capacity to bear the risk can be said to be an expression of that maximum unexpected loss that the bank could suffer without endangering its very existence. This of course calls for a proper valuation of the reserves that has already been created in order to cover up the unexpected loss. Once the bank has decided upon how much of the total risk it can bear, it then has the job of allocating the total risk towards individual risk limits among its business areas and its customers. This ultimately results in a limit system. The basic purpose of the risk limit is that it ensures that the risk that the bank engages in does not exceed the maximum limit that the bank has undertaken. Such an allocation of the risks require for the appropriate quantification of risks that can be limited to set levels. As a matter of practice not all of the risks can be quantified. Similarly the expenses that are associated with the quantification of the risks cannot be properly justified. As a result the non-quantifiable risks cannot be limited in amount and also cannot be built directly into the appropriate limit system. From the bank's angle, the limitation of a risk by means of a risk total for the bank as a whole also requires that the various forms of risks be uniformly measured and then limited. An adequate risk management framework consists of the indispensable elements, summaries that compare the actual data with the planned one, a proper analysis of the reasons for the variance, if any, and a list of all the problems. Thus in a good and effective risk management framework, clear distinction must be made between the risk management and the risk taking ability of the firm. The risk management framework is a complex and a multifaceted process. It is to be viewed as an ongoing process that needs continuous oversight, planning and due modifications whenever the situation demands.

Proper Risk Management Policies and Procedures

- It is essential that the interest rate policies of the bank and its procedures are clearly defined and consistent with the nature and the complexities of their activities. These polices should address the bank's exposure on a consolidated basis.
- It is of utmost importance that the banks are able to identify the various kinds of risks that are inherent in the new products and activities. The major hedging and the risk management initiatives should be approved well in advance by the board or its appropriate delegated committees.

Proper Risk Management and Monitoring Systems

- It is important for any bank to have an interest rate measurement system that is able to capture all its material resources associated with the interest rate risk and assess the impact of the interest rate risk that is not in tune with the scope of its activities.
- It is also important that the banks are able to measure their weaknesses under the competitive market conditions.

- It is important for the banks to establish and enforce operating limits and other measures that are able to maintain exposure within the different levels that are consistent with the internal policies of the bank.
- Banks should also be equipped with adequate information systems for the purpose of proper monitoring and reporting interest rate exposures to the senior management and the Board of Directors on a regular basis.

A Sound Internal Control and Independent External Audit

It is essential for the banks to have adequate internal control systems to manage their interest rate risk. They should evaluate the adequacy and the integrity of these controls periodically. The individuals who are entrusted with this job must be independent and not attached to the concerned departments.

Management of Exchange Rate Risk

Moving on to the management of exchange rate risk, this is a difficult area for a bank. Many banks do not manage currency exposure beyond monitoring changes in the value of foreign exchange reserves. As a consequence, most of the normal measures of exchange rate exposure that are used in commercial institutions are of limited use to a bank. Instead, they focus on ensuring that the reserve remains distributed among its different component currencies in line with a target composition dictated by the bank's exchange rate policy objectives, and the source of the funding used to create the reserve.

This type of approach requires specific support from the system, particularly if the reserve composition needs to be monitored intraday. If the currency distribution is also being reported from other sources (for example, statistical or accounting systems) then the bank needs to ensure that the calculations used are done on a consistent basis between different systems. Finally, if limits are going to be applied to the currency distribution, then the underlying valuation and position information needs to be available within the limits module.

Management of Liquidity Risk

For policy purposes, banks hold a significant proportion of foreign reserves in liquid assets that generally generate lower returns than less liquid forms of investment. A bank needs to be aware of the risk of over concentration in a particular asset class, issue, or sector, effectively reducing liquidity. This is a particular risk for larger banks, due to the large size of the reserves they manage. Many banks implement controls on how the reserve can be distributed between different asset classes, issues or sectors. In order to support this, the system needs to be able to record in some way the bank's classification of assets and to make that information available, either in reports or in the limits component of the system. However, the classifications used for this purpose are often different from those used for other purposes (accounting, performance attribution, statistical reporting).

Management of Credit Risk

Although banks like to keep credit risk at a minimum, some level of it is unavoidable, as a result of the need to carry out policy operations in the foreign exchange markets, the requirement to provide liquidity to the domestic markets and the need to manage the foreign reserves. Monitoring credit risk is normally done by setting limits for different types of credit exposures, such as, counterparty, issuer, settlement, country, correspondent/custodian etc. There is a great deal of variation in the way that credit exposures are calculated within different institutions for different types of exposure and for different instruments. However, any system needs to take into account the legal status of the bank's counterparties and the fact that most bank transactions are collateralized. Maintenance of limits and the management of excesses are other aspects to take into account, as these can have considerable influence on the workload of those responsible for

managing and monitoring limits. Factors, such as whether or not the system differentiates user initiated excesses from technical excesses caused by market movements, can have a significant impact on the effectiveness of the system.

PERFORMANCE MEASUREMENT

Apart from managing risk, another use of the system can be to assess a bank's performance in its financial market operations. In some areas of bank operations, such as foreign exchange policy operations or monetary policy operations, there are no generally accepted methods for quantifying performance. However, in other areas, such as the investment performance of the foreign reserve, banks often use similar techniques to those used by commercial investment managers, such as time weighted return figures.

Time weighted return calculates the daily rate of return on a portfolio of assets as a percentage of the capital invested. Its big advantage is that it provides a return figure that is independent of inflows and outflows of capital from the portfolio. If some form of benchmark is used to set risk and return targets for the managers of the reserve, then the return figures for the reserve can be compared over time with similar figures calculated for this benchmark. Information on risk-adjusted performance is best presented in a way that allows some degree of performance in the reserve, so that the results of the different investment strategies and decisions applied can be assessed.

Care needs to be taken when considering the performance measurement capabilities of different systems because, while the systems may well conform to the performance presentation standards, there may well be significant differences in the facilities available for the analysis of the performance information. This is particularly true in areas of performance attribution and risk-adjusted return analysis.

At present, there is no generally accepted approach to performance attribution in fixed income markets, with some institutions favoring approaches focused on the relative creditworthiness of different issuers and others favoring attribution based on instrument characteristics, such as coupon, maturity and spread. Different systems support these different approaches to a greater or lesser extent.

OTHER PORTFOLIO TECHNIQUES

Besides VaR, banks often use other portfolio techniques, such as Monte Carlo simulation, historical simulation and stress testing. These techniques attempt to assess the maximum possible loss that may occur as a result of extraordinary market movements when applied to the current portfolio. The difference between the techniques lie in how the scenarios for possible market movements are generated. With stress testing, discrete 'extreme' scenarios are taken and applied to the current portfolio to determine the maximum loss. These scenarios are generated either from historic data relating to extreme market movements or are manually generated, based on individual assessments of potential worst-case situations.

In historical simulation, all the available historical data on market movements is applied to the current portfolio to determine the worst-case loss over a defined period.

In Monte Carlo simulation, historic market data is combined with user-supplied assumptions about the statistical distribution of movements in market data to derive a function that describes the distribution of these movements. This function is then used to randomly generate 'possible' movements in market data that are then applied to the current portfolio to determine the worst-case loss over a defined period.

All these techniques place different demands on the risk management system. Stress testing can generally be achieved with any system that incorporates the ability to store and apply market information scenarios. Both historical and Monte Carlo simulation require specific system support in order to carry out the calculations, and there are very few banks that do this.

As stated earlier there are many different elements to this infrastructure, including organization, management, procedures and controls, all of which have an impact on the effectiveness of the implemented framework. However, virtually all of these elements are impacted by the implementation of a new system.

Viewing Risk Management as a Closed Circle

The inclusion and the management of risk in a risk management system takes the form of a closed circle. Here, the risks are first identified, followed by risk measurement and finally controlling the risk. The risks are monitored regularly, which ascertains that the risks are within the prescribed limits. If this is not the case, the circle starts again. The extra risks are identified, measured and then corrected. Within the risk management framework of a bank, the board of directors and the senior management are responsible for framing the risk management strategy. It is up to them to approve the risky policies and thus the overall framework of the bank's risk management and also to supervise its implementation. It is their responsibility to ensure that the structures and the processes are implemented that can guarantee a systematic, efficient and effective risk management. Finally, the board along with the directors and the senior management.

On the other hand, it is also to be remembered that it is not the responsibility of the board and the senior management to identify, measure and control the risk at the operational level. Direct interference in these kinds of risk processes by the board and the senior management should occur only in exceptional cases. As a matter of practice, it is usually observed that there is a certain tendency to focus the discussion of risk management on technical and methodical aspects. High level of risk consciousness and proper level of training of all persons involved in risk management are found to be indispensable to a successful risk management structure. Here, it is also to be mentioned that the organizational aspects of risk management need not be ignored. Proper attention is to be given to the segregation of duties in particular.

EFFICIENT RISK MANAGEMENT FRAMEWORK

The basic objectives of risk management can vary to certain degrees. Such objectives can be risk recognition, risk avoidance, risk limitation, or even the optimization of the risk income profile. Each of these different objectives calls for differing demands on the concepts, methods, systems and instruments. For example, limiting particular levels of risks by means of risk limits is sometimes more demanding than risk avoidance, the reason being risk limitation calls for quantification of risks. The apparently harmless demand for the effective limitation of the overall risk of the bank through a global limit proves to be a real challenge because strictly speaking it means the risk must be quantified in its entirety. Added to this, all the risks must be quantifiable in a comparable way so that they can be aggregated to give the overall risk of the bank. With the number of objectives increasing, the associated cost also increases. Say a particular bank wants not only to limit its risks, but also to optimize the potential for gains, then it has to allocate and define the income and expense as well. Generally speaking, the more ambitious the objectives, the higher are the cost incurrence for the risk management system of a bank.

For a given objective, an efficient risk management framework means that the bank will customize the entire risk management system adhering to that particular level of objective. Good solutions cater to the objectives that are defined by the bank. The proper conception and realization of successful risk management framework is based on the clearly defined and concrete objectives. The very determination of the objectives of the risk management is a decision of strategic importance. As these have a continuous influence on the competitive capability of the bank, therefore, setting the risk management objectives of the bank becomes a part of the central responsibility of the board of directors and the top management. The senior bodies are especially responsible for the bank's risk policy.

The Bank's Risk Policy: Systematic Framework

The risk policy of the bank sets the conceptual framework for the purpose of operational risk management. The purpose of the risk policy is not only to define the objectives, priorities and principles of the bank's risk management but also its instruments, resources and responsibilities. It is the responsibility of the board of directors to approve the risky policies. It is also their responsibility to see that the approved risk policies are properly implemented. For this particular purpose, a catalogue of measure that describes a change from a current situation to the risk management system becomes an important component of a bank's risk policy. It is the responsibility of the bank to ensure that the risk policies are implemented at appropriate levels and is adhered to in day-to-day operations.

Risk Identification

The process of risk management starts with, first the bank recognizing all of its risks more systematically, and then classifying and assigning them to various areas of responsibilities or towards products or markets. This also includes the operational definition of the risks. To this extent, risk identification is said to be a means of sorting the different kinds of risks, according to a certain structure.

When it comes to deciding upon the quality of risk management, the following factors come into play. They are:

- Proper knowledge of the products, the various business areas and markets that is inherent in these areas and the primary causes of their existence.
- A more consistent order of risk management.
- Clear and more operational definitions of risk management.

If the process of risk management is incomplete, there can be the existing danger that the banks will not be able to cover the unidentified risks in the risk management framework. There is an added danger that the reduction of the identified risks may be accompanied by the increase of the unidentified risks. Another point that is to be considered while identifying risk is that the process of risk identification is not a one time exercise. Rather it is an ongoing process that must always be given due attention when new kinds of risks arise.

Setting the Right Priorities

While the risk identification process is carried on, the process of structuring the risks serves as a basis to set the priorities in risk management. Setting the priorities initially calls for deploying the resources in risk management as per the significance of the risk in relation to the overall risk that the bank is facing.

Irrespective of the size of the individual risks, the risk management process calls for the measuring and controlling of risk at a reasonable cost. As per the importance of the individual risks, the various tools used as well as the technical resources must be appropriate. This principle is applicable not only within the framework of a bank, but also to the length and breadth of the financial sector.

Specifically speaking, where the core areas are concerned, risk management purpose is not only avoiding the acute danger, but also effective risk management with strategic orientation. Even a small bank has to control its risks in the core areas effectively in order to survive. The real challenge that a bank faces is however, to find solutions that are required for its individual needs, features and possibilities. Significant improvements in managing the risk of a bank are often achieved by rational measures and instruments. Such risk management systems show quick results and even justify the efforts.

- The increasing amount of competitive and regulatory pressures has compelled various organizations to an enterprise risk management framework. Banks are exposed to different types of risks. Risk management framework can be treated as a mirror of efficient corporate governance of a financial institution.
- Globalization and significant competition between foreign and domestic banks, survival and optimizing returns are very crucial for banks and financial institutions. There are, of course, a few fundamental pillars that necessitate a well defined risk management framework in any bank, namely, the corporate culture, different procedures and the technology aspect.
- Corporate culture acts as an important element in the risk management framework. The risk management process must be evolved within the organization. The basic framework of risk management consists of the elements such as management of interest rate risk, management of exchange rate risk, management of liquidity risk, management of credit risk, performance measurement and other portfolio techniques. The risk policy of the bank sets the conceptual framework for the purpose of operational risk management.
- Along with the efficient risk management practices, the other important factor for success is selecting the efficient customer and providing innovative and value added financial products and services to them.

Chapter IX

Asset-Liability Management in Banks

After reading this chapter, you will be conversant with:

- Need for Macro- and Micro-level Asset-Liability Management
- Asset-Liability Management and its Purpose
- Role of Asset-Liability Management Committee
- The Asset-Liability Management Process
- Regulatory Prescription for Asset-Liability Management

Asset-Liability Management (ALM) is concerned with the strategic balance sheet management involving risks caused by changes in the interest rates, exchange rates and the liquidity position of the bank. While managing these three risks forms the crux of ALM, credit risk and contingency risk also form a part of the ALM. The significance of ALM to the financial sector is further highlighted due to the dramatic changes that have occurred in recent years in the assets (uses of funds) and liabilities (sources of funds) of banks.

In India, the post-liberalization period witnessed a rapid industrial growth, which has further stimulated the growth in the fund raising activities. With the rise in the demand for funds, there has also been a remarkable shift in the features of the sources and uses of funds of banks. Traditionally, administered rates were used to price the assets and liabilities of banks. However, in the deregulated environment, competition has narrowed the spreads of the banks. This led to discriminate pricing policies, and also highlighted the need to match the maturities of the assets and liabilities. The changes in the profile of the sources and uses of funds are reflected in the borrowers' profile, in the industry profile and the exposure limits for the same, in the interest rate structure for deposits and advances, etc. The developments that took place since liberalization led to a remarkable transition in the risk profile of the financial intermediaries. The main reasons for the growing significance of ALM are:

- Volatility,
- Product innovations,
- Regulatory environment, and
- Management Recognition.

Volatility: An increasing number of free economies are being witnessed in recent times with more and more nations globalizing their operations. Closely regulated markets are paving way for market-driven economies. Such deregulation has changed the dynamics of the financial markets. The vagaries of such free economic environment are reflected in the interest rate structures, money supply and the overall credit position of the market, the exchange rates and price levels. For a business which involves trading in money, rate fluctuations invariably affect the market value, yields/costs of the assets/liabilities which further affect the market value of the bank and its Net Interest Income (NII). Tackling this situation, would have been a very easy task, in a set-up where the interest rate movements are known with accuracy and where the volatility in the exchange rates is considerably lower.

Product Innovation: The second reason for the growing importance of ALM is the rapid innovations taking place in the financial products of the bank. While some innovations came as passing fads, others have received tremendous response. In several cases, the same product has been repackaged with certain differences and offered by various banks. Whatever may be the features of the products, most of them have an impact on the risk profile of the bank thereby enhancing the need for ALM. Consider the flexi-deposit facility banks are now offering for their term deposits. Earlier, if a depositor, who has a term deposit of Rs.1 lakh, was in need of funds, say Rs.25,000, before the date of maturity of the term deposit or raise a loan. In order to discourage this, banks charge a penalty on the entire amount for premature withdrawal. This served as a disincentive for premature withdrawals and also reduced the risk for the bank. However, with the introduction of the flexi-deposit facility, the deposit of Rs.1 lakh will be

segregated into deposits of smaller denominations, say 100 deposits of Rs.1,000 each. This enables the investor to withdraw the required amount before maturity since the burden of penalty is limited. However, it will also enhance the risk of the bank. With a reduction in the penalty amount, the depositor would make a demand for the premature withdrawal at any time. To reduce the impact of the asset-liability mismatch that arises due to this early withdrawal of funds, the bank will have to raise a liability to match the outflow. In such case, the bank will be faced with liquidity risk when there is sudden outflow of funds as well as interest rate risk since it may have to raise a liability at a higher cost.

Regulatory Environment: In order to enable the banks to cope with the changing environment that has resulted due to the integration of the domestic markets with the international markets, the regulatory bodies of various financial markets have initiated a number of measures. These measures were taken with an objective to prevent major losses that may arise due to the market vagaries. One step in this direction was the increased focus on the management of the bank's assets and liabilities. At the international level, the Bank of International Settlements (BIS) provides a framework for the banks to tackle the market risks that may arise due to rate fluctuations and excessive credit risk. The RBI is also following this direction and has recently issued a framework for banks to develop ALM policies. In addition to this, there are various guidelines issued by the regulator on the risk based capital to be maintained by the banks in order to tackle the credit risk.

Management Recognition: All the above mentioned aspects forced the managements of the banks to give a serious thought about the management of the assets and liabilities. Managements have realized that it is just not sufficient to have a very good franchise for credit disbursement nor is it enough to have just a very good retail deposits base. In addition to these, the bank should be in a position to relate and link the asset side with the liability side. And this calls for efficient asset-liability management.

There is increasing awareness in the top management that banking is now a different game altogether because all the rules of the game have since been changed.

ALM is a technique to measure the matching of assets and liabilities, thereby, assisting in prudent management of an investment portfolio. The objective of ALM is not necessarily achieving the perfect match of assets and liabilities; but rather, the prudent management of mismatch. A prudent match would be one where changes in the present value of assets equal changes in the present value of liabilities.

How to Measure Matching?

There are various methods available for matching. Amongst them, duration and convexity are widely used. Duration is a measure of price sensitivity to interest rates. It is defined as the weighted average maturity in which the weights are stated in present value terms. For coupon bearing bonds, duration must be modified as follows in order to be an indicator of price movements.

Duration

Modified Duration=[1 + (Yield to maturity/Number of coupon payments per year)]

Convexity is defined as the change in duration relative to the change in yield and helps explain the difference between the actual price of bond and the price estimated by using duration.

Purpose of ALM

This enhanced level of importance to the ALM has led to a change in the nature of its functions. It is no longer a stand-alone analytical function. While there are macro- and micro-level objectives of ALM, it is, however, the micro-level objectives that hold the key for attaining the macro-level objectives. At the macro-level, ALM leads to the formulation of critical business policies, efficient allocation of capital and designing of products with appropriate pricing strategies. And at the micro-level, the objective functions of the ALM are two-fold. They aim at profitability through price-matching basically aims to maintain spreads by ensuring that the deployment of liabilities will be at a rate higher than the costs. Similarly, liquidity is ensured by grouping the assets/liabilities based on their maturing profiles. The gap is then assessed to identify the future financing requirements. This ensures liquidity by matching the maturity levels is not an easy task.

The following tables explain the process involved in price-matching and maturity-matching.

	Tab	le 1.1		Table 1.2 (Rearranged)					
Liabilities		Assets		Liabilities		Assets			
Amt.	Rate (%)	Amt.	Rate (%)	Amt.	Rate	Amt.	Rate	Spread	
					(%)		(%)	(%)	
15	0	10	0	10	0	10	0	0	
25	5	20	12	5	0	5	12	12	
30	12	50	15	15	5	15	12	7	
30	13	20	18	10	5	10	15	10	
				30	12	30	15	3	
				10	13	10	15	2	
				20	13	20	18	5	
100	8.75*	100	13.5*	100	8.75*	100	13.5*	4.75*	

(Rs. in crore)

* Average cost/return on liabilities/assets.

Table 2: Maturity-Matching

(Rs. in crore) (Period in months)

	Table	2.1		Table 2.2 (Rearranged)				
Liabilities	Maturing within (months)	Assets	Maturing within (months)	Liabilities	Assets	Gap	Cumulative Gap	
10	1	15	<1	10	15	- 5	- 5	
5	3	10	3	5	10	- 5	-10	
8	6	5	6	8	5	+ 3	- 7	
4	12	10	12	4	10	- 6	-13	
45	24	30	24	45	30	+15	+ 2	
20	36	10	36	20	10	+10	+12	
8	>36	20	>36	8	20	-12	0	
100		100		100	100			

Table 1 shows how a proper deployment of liabilities can ensure positive spreads. These spreads can, however, be attained if the interest rate movements are known with accuracy, and the forecasts made fall close to actual movements. This approach further ignores maturity mismatches, which may to a certain extent affect the expected results.

Similarly, Table 2 helps determine the gap that exists by using forecasted cash flows, both inflows and outflows. It further forecasts the surplus/deficit fund position and thereby enables better financing plan. Maturity matching, however, is possible if the financial requirements are forecasted accurately. This approach does not integrate fully with the price matching concept. Though these two approaches i.e., price-matching and maturity-matching effectively reduce risks, the methodology adopted may not be feasible in reality.

The above approaches help the management to have an understanding of the structure of the balance sheet. In fact these two approaches contradict each other to some extent because a spread is possible when a mismatch of maturity is taken up. There has to be a trade-off between the two.

Similar position may occur when the exchange rate risk is tackled without considering the interest rate risk. Thus, risk management approaches for ALM cannot be one-dimensional since the risks need to be managed collectively. The interlinkage present between them also emphasizes this point. An effective ALM technique aims to manage the volume, mix, maturity, rate sensitivity, quality and liquidity of the assets and liabilities as a whole so as to attain a predetermined acceptable risk/reward ratio. The purpose of ALM is thus, to enhance the asset quality, quantify the risks associated with the assets and liabilities and further manage them. The process will involve the following steps:

- Firstly, review the interest rate structure and compare the same with the interest/product pricing of both assets and liabilities. This to a certain extent will highlight the impending risks and the need for managing the same.
- Secondly, examine the loan and the investment portfolios in the light of the foreign exchange risk and liquidity risk that might arise. At the same time, the effect of these risks on the value and cost of liabilities should also be given due consideration.
- Thirdly, examine the probability of the credit risk and contingency risk that may originate either due to rate fluctuations or otherwise and assess the quality of assets.
- Finally, review the actual performance against the projections made and analyze the reasons for any effect on the spreads.

The above mentioned steps envelope the tasks of asset-liability management i.e., identification of the various risks present in the system and designing an appropriate ALM technique that suits the organizational requirements. The ALM technique so designed to manage the various risks will primarily aim to stabilize the short-term profits, long-term earnings and long run sustenance of the bank. The parameter that is selected for the purpose of stabilizing will also indicate the target account that needs to be managed. The most common target accounts in ALM of banks are:

- **Net Interest Income (NII):** The impact of volatility on the short-term profits is measured by NII. Hence, if a bank has to stabilize its short-term profits, it will have to minimize the fluctuations in the NII.
- Market Value of Equity (MVE): The market value of equity represents the long-term profits of the bank. The bank will have to minimize adverse movement in this value due to rate fluctuations. The target account will thus be MVE. In the case of unlisted banks, the difference between the market value of assets and liabilities will be the target account.

• Economic Equity Ratio (EER): The ratio of the shareholders funds to the total assets measures the shifts in the ratio of owned funds to total funds. This in fact assesses the sustenance capacity of the bank. Stabilizing this account will generally come as a statutory requirement.

While the bank can target any one account, it is, however, essential to observe the impact on the other accounts also. While both NII and MVE may be affected favorably/adversely, there may also be instances where one may be affected favorably while the other may be affected adversely. Considering these different situations, the bank may sometimes lay exclusive focus on the short-term profits and take decisions that have an adverse impact on the long-term profits of the bank and vice-versa. It is not possible to simultaneously eliminate completely the volatility of both income and market value. Hence, it should balance between these two objectives. A much detailed explanation on this can be obtained while discussing the various risks.

ALM Implementation

Indian financial sector reforms in the 1990s brought unprecedented changes in the banking sector. The interest rate deregulations, the opening up of the various financial markets combined with the intensifying competition have been affecting the spreads of the banks. And, while these measures were taken several years ago the adjustment process of the banks to these developments has not yet taken off in a big way.

The pressures arising on the profitability, liquidity and sustainability of the bank cannot always be tackled on a fire-fighting basis. Such approach may be successful in certain instances, but not at all times. A better alternative for the banks will be to take a strategic perspective while addressing the aspects related to the interest rate/exchange rate fluctuations, liquidity positioning, credit accommodation, etc.

To take a strategic perspective, banks should first of all understand the risks that have to be taken in order to gain the rewards that are set as the target. The earlier chapters have discussed the various types of risks that the banks are exposed to and also a few risk management models. This, however, leaves unanswered the question of how to implement the risk management process. This chapter discusses the implementation part of the ALM, highlighting the role played by the various levels of management in this process.

Macro- and Micro-level ALM

Management of risks should be at two levels: macro-level and micro-level. The macro-level risk management will involve providing a risk management framework for the bank and hence the decision makers will clearly comprise the bank's board and the top management. On the other hand, at the micro-level business decisions will be taken by the business managers, but within the broad framework laid at the macro-level. Consider the following illustrations that distinguish between the macro- and micro-level decisions for ALM:

- Term loan for an aqua firm;
- Investment in 10-year government paper;
- Investment in the commercial paper issue of a company;
- Acceptance of FCNR (B) deposit.

At the macro-level, the bank will have to decide on -

- Whether or not to lend to the aquaculture industry and in case it decides to lend, then the exposure level for lending;
- Whether or not to invest in a government paper/other securities having maturity, of say over 5 years and the limit that can be set for such investments;
- Whether or not to invest in the CPs issued by a company having a rating of less than P1+; and
- Lastly, whether to accept FCNR(B) deposits and the limits for such acceptance.

Thus at the macro-level, broad guidelines will be given in order to enable day-today decisions to be taken relating to individual proposals for investment and borrowing without the involvement of the top management. The board should clearly communicate to the business managers the acceptable level of risks in terms of the parameters chosen. This macro-level management of risk will be conducted by the Asset-Liability Management Committee (ALCO). ALCO shall not consider individual cases for decision-making.

In the above instances, if the ALCO decides that the bank shall not extend any loan facility to aqua projects, shall not invest in securities having maturity greater than 5 years and in CPs of firms having a credit rating of less than P1+ and shall not accept any FCNR(B) deposits, then the business managers should take decisions within this framework.

At the micro-level, risk management will be conducted by the business managers of the independent divisions. These business managers will base their investment and borrowing decisions on the ALCO recommendations and hence the ALCO need not be referred to for all individual decisions.

ASSET-LIABILITY MANAGEMENT COMMITTEE (ALCO)

The role of ALCO is, thus, to formulate and oversee the function of ALM in the bank without getting into the day-to-day decision-making process for raising or deployment of resources. It involves taking the overall responsibility for risk management in the bank and issuing guidelines for the various divisions of the bank. Due to the role of a strategic decision-making body, the ALCO is generally headed by the Chairman/CEO of the bank, while the other members may comprise the other full-time directors. Due to the ramifications which ALM has on the various activities of the bank, the heads of various divisions viz., Credit division, Investment division, Deposit division, MIS division and Economic Research division may also form a part of the ALCO.

While ALM policies will have a direct bearing on the credit, investment and deposit divisions, the MIS and the economic research divisions will be acting as support divisions for the formulation of the ALM policies. All historical data required for preparing various reports and to analyze the trends in deposit and lending pattern will be provided by the MIS division. On the other hand, the information required for forecasting the future trends in the interest/exchange rates, lending and borrowing pattern will be provided by the economic research division. Thus, MIS enables in the assessment of the present level of risk while the economic research division helps in estimating the future risk profile of the bank. Apart from the above mentioned members, ALCO may also involve members from other divisions who also depend on the activities of the bank. Further, depending on the level of activities, the bank may also have sub-committees in the areas of foreign exchange risk, interest rate risk, liquidity risk, investment, funding, etc.

Considering that the ALCO focuses on the macro-level management of the bank's risks, the members of the ALCO should have a clear understanding and knowledge of the type of the risks inherent to the banking business in order to review and approve appropriate policies to limit the risks, to change the strategies of the bank along with the changes taking place in the market conditions. The measures taken may be to ensure that the bank accepts those risks which it is able to manage and also to set the firm-wide risk levels that are to be maintained. The typical business issues that an ALCO would address include:

- Reviewing the impact of the regulatory changes on the industry.
- Overseeing the budgeting process.
- Reviewing interest rate outlook for pricing of assets and liabilities (loans and deposits).
- Deciding on the introduction of any new loan/deposit products and their impact on interest rate/exchange rate risks and other market risks.

- Reviewing the asset and liability portfolios and the risk limits and thereby assessing the capital adequacy.
- Deciding on the desired maturity profile of incremental assets and liabilities and thereby assessing the liquidity risk.
- Reviewing the variances in actual and projected performances with regard to the NIM, spreads and other balance sheet ratios.

In addition to all the above mentioned issues, there is yet another important aspect for which the ALCO is responsible – the successful implementation of ALM. It must ensure that there is adequate and necessary software and management information systems in place along with the required expertise to regularly monitor and report the risks and the risk levels of the bank.

The efficiency of the Management of Information Systems (MIS) will have a major role to play in the development of a good ALM policy for the bank. The comprehensiveness, relevance and timeliness of the information will help the ALCO in preparing policy statements with clarity. Clarity in the policy statement is essential for the successful implementation of the ALM at the micro-level. Yet another important feature of the policy statement is that it is not a static statement. The changing operating and regulatory environments require the ALCO to review and monitor the risks, thereby giving rise for a need to modify the policy statement.

This clarity and contemporary nature of the policy statement is essential for the successful micro-level management of the ALM. At the micro-level, the business managers will be operating and taking decisions based on the framework laid down by the ALCO.

Frequency of Meetings

It is desirable to predetermine the frequency of the meetings of ALCO, which should be at least once-a-month. This frequency enables the ALCO to take stock of the changes that have taken place since the last meeting in a manageable way. There can be special meetings called for tackling exigencies such as volatility in interest rates or exchange rates. Notwithstanding the above, it is necessary to have a detailed meeting for finalization of the policy every year in which specific key parameters are quantified. If the management pays greater attention at this stage by involving middle/senior level managers, it will facilitate in the development of an effective decision support system.

Data Requirements

The need for adequate, accurate and timely data for the successful implementation of the ALM at both the macro- and micro-level should be definitely emphasized. As the entire ALM process depends on the availability of data, the bank should have proper systems that provide accurate and reliable data that is easily accessible to the decision makers. Defining the data requirements at the time of development/acquisition of software, would smoothen the ALM decision-making process. The input data for the ALM process will include data available with the individual branches and that which is with the corporate office. The maturity profile of assets and liabilities, the trends for prepayment of assets/liabilities will have to be sourced from branches. The consolidated data of the past, future projections, macro-level trends and forecasts will have to be generated at corporate office. The crucial issues for the MIS are listed below:

- Identification of specific inputs;
- Identification of process to which the inputs are subjected to;
- The details of output to be generated;
- Design of formats for collection of inputs and presentation of output.

It must be ensured that the reports that are presented for review are such that the details in the reports are inversely related to the hierarchy of the reviewer. The top management should clearly identify the key parameters which it wants to monitor so that the review remains focused instead of getting lost in a maze of information.

The level of frequency, level of details, accuracy of information that is required for ALM does call for considerable investment in terms of hardware and software in view of the widely dispersed network. However, the benefits accruing out of this are likely to outweigh the costs involved in the long run.

Internal Controls

As already mentioned, the MIS relating to output must be carefully planned. Detailed internal control systems have to be laid down along with a mechanism to ensure adherence to the policy framework so that the bank is not caught off-guard by unpleasant developments. One must remember that it is failures of this kind that can throw up a Barings bank or Daiwa bank type situation.

Internationally, banks have been developing the necessary systems, both hardware and software, for ALM. However, the same is yet to take place in the Indian banks. Most banks do not have the basic data required for simple analysis. It is thus necessary for the banks to start off the process of ALM.

Initiating ALM Process

Generally, implementation of ALM will involve strategic decisions due to which they have to develop internally by the bank's management. However, this has not been the case with most Indian banks. Though the reasons for such lack of initiative are varied, one important reason could be that the Indian banks had so far been restricted to a closed operational environment with little exposure to the open market. Be that as it may, the lack of initiative by the banks towards ALM, in spite of its relevance, has forced the RBI to step in and start off the process.

As a regulator of the banking sector in India, the RBI has developed an ALM framework (refer Appendix I). This framework discusses an ALM model based on Gap Analysis and is intended to introduce the banks to the process of ALM.

Based on the RBI model, banks can segregate their assets and liabilities into various maturity buckets and also identify those assets and liabilities which are sensitive to interest rate movements. While deciding about the liquidity requirements in certain cases, the RBI has given only a benchmark. If adequate information is available to the ALCO of a bank on the maturity patterns of their assets and liabilities, it can set the liquidity limits for the different maturity buckets. Consider the case of current and savings deposits. Based on the previous experience, each bank can estimate the volatile and core portion of the current/savings bank deposit and hence can assess the liquidity requirements accordingly. The ratio of stable to volatile deposits is taken based on the consolidated figure of the savings bank/current deposit. Similarly, if the ALCO is able to forecast the movements of the interest rates with greater accuracy, using more sophisticated methods, it will then be in a position to ascertain the sensitivity of its assets and liabilities and take measures to prevent any adverse impact on its NIM and MV of equity.

There are a few issues that need to be raised in the RBI's classification of the assets and liabilities based on liquidity and sensitivity. In the case of export refinance, for instance, the RBI has mentioned that the maturity profile of the availed portion of export refinance has to be based on the underlying assets. This implies that there should be a case to case analysis to determine the maturity profile which will be a tedious task. Instead, the bank can use the consolidated figure of the refinance (as in the case of the savings bank deposit account) and based on past experience can identify a core portion and a variable portion. The core portion can be classified under the 1-3 years bucket while the variable portion can be classified under 1-14 days time bucket. This can be a dynamic process if the distinction between core portion and variable portion are reviewed monthly.

The core portion of the savings bank deposit is classified as sensitive and placed under the 3-6 months bucket. However, the frequency with which the savings bank rate changes is very low. In fact, the revision of savings bank rate along with revision in term deposit rates is more an exception than rule. Due to this reason, the core portion of the savings bank deposits may also be considered as non-rate sensitive. Further, the borrowings from RBI are placed under the one-month time bucket for rate sensitivity purpose. The point to be noted here is that the borrowings are eligible for a period of 14 days after which it may be extended. Thus, the time bucket for such borrowings may be 14 days instead of one month. However, the adverse impact of this may not be felt significantly, since the rate change in this case will be brought about by the regulator and not by the market.

Banks can initiate the process of ALM using this framework of ALM given by the RBI. However, considering that the framework is developed for the common use of all banks, there will be a definite scope for banks to develop this model based on the operational styles and the information systems available to them. Apart from this model which targets the interest rate risk and liquidity risk of banks, the regulator has also been addressing the credit risk of the banks. The second set of guidelines on risk management [Refer Appendix VI] relate to an integrated risk management system covering aspects related to credit risk, liquidity risk, etc. The RBI has also hinted moving towards VAR and Duration Analysis. Even global regulations governing the credit risk given in the Basle Accord are taken into consideration. The various guidelines issued by the regulator are to ensure that the process of risk management becomes a regular exercise of the banking business. However, it has to be understood that the process of ALM is multifaceted and will vary from one bank to another. Banks should keep in view their requirements for managing the risks and do the needful for the successful implementation of the ALM.

SUMMARY

- The paradigm shift in the risk exposure levels of the financial institutions, has definitely led to ALM assuming a center stage. Undoubtedly, all financial institutions need to perform ALM. But to have a proper ALM process in place, a thorough understanding of the various operations of the financial institution and their implications on its assets and liabilities becomes essential.
- Such an understanding will enable the financial institution to identify and unbundle the risks and further aid in adopting and developing appropriate risk management models to manage risks both in the short-run as well as in the long run.

Annexure I

Asset-Liability Management System in Banks – RBI Guidelines

In the normal course, banks are exposed to credit and market risks in view of 1. the asset-liability transformation. With liberalization in Indian financial markets over the last few years and growing integration of domestic markets and with external markets, the risks associated with banks' operations have become complex and large, requiring strategic management. Banks are now operating in a fairly deregulated environment and are required to determine on their own, the interest rates on deposits and advances in both domestic and foreign currencies on a dynamic basis. The interest rates on banks' investments in government and other securities are also now market related. Intense competition for business involving both the assets and liabilities, together with increasing volatility in the domestic interest rates as well as foreign exchange rates, has brought pressure on the management of banks to maintain a good balance among spreads, profitability and long-term viability. Imprudent liquidity management can put banks' earnings and reputation at great risk. These pressures call for structured and comprehensive measures and not just ad hoc action. The management of banks has to base their business decisions on a dynamic and integrated risk management system and process, driven by corporate strategy. Banks are exposed to several major risks in the course of their business like - credit risk, interest rate risk, foreign exchange risk, equity/commodity price risk, liquidity risk and operational risk. It is, therefore, important that banks introduce effective risk management systems that address the issues related to interest rate, currency and liquidity risks.

Banks need to address these risks in a structured manner by upgrading their risk management and adopting more comprehensive Asset-Liability Management (ALM) practices that has been done hitherto. ALM, among other functions, is also concerned with risk management and provides a comprehensive and dynamic framework for measuring, monitoring and managing liquidity, interest rate, foreign exchange and equity and commodity price risks of a bank that needs to be closely integrated with the banks' business strategy. It involves assessment of various types of risks and altering the asset-liability portfolio in a dynamic way in order to manage risks.

- 2. This note lays down broad guidelines in respect of interest rate and liquidity risk management systems in banks which form part of the Asset-Liability Management (ALM) function. The initial focus of the ALM function would be to enforce the risk management discipline viz. managing business after assessing the risks involved. The objective of good risk management systems should be that these systems will evolve into a strategic tool for bank management.
- 3. The ALM process rests on three pillars:
 - ALM information systems
 - Management Information System
 - Information availability, accuracy, adequacy and expediency
 - ALM organization
 - Structure and responsibilities
 - Level of top management involvement
 - ALM process
 - Risk parameters
 - Risk identification
 - Risk measurement
 - Risk management
 - Risk policies and tolerance levels.

4. ALM Information Systems

ALM has to be supported by a management philosophy which clearly specifies the risk policies and tolerance limits. This framework needs to be built on sound methodology with necessary information system as back-up. Thus, information is the key to the ALM process. It is, however, recognized that varied business profiles of banks in the public and private sector as well as those of foreign banks do not make the adoption of a uniform ALM system feasible for all banks. There are various methods prevalent worldwide for measuring risks. These range from the simple Gap Statement to extremely sophisticated and data intensive Risk Adjusted Profitability Measurement Methods. However, the central element for the entire ALM exercise is the availability of adequate and accurate information with expedience; and the existing systems in many Indian banks do not generate information in the manner required for ALM. Collecting accurate data in a timely manner will be the biggest challenge before the banks, particularly those having wide network but lacking full-scale computerization. However, the introduction of base information system for risk measurement and monitoring has to be addressed urgently. As banks are aware, internationally, regulators have prescribed or are in the process of prescribing capital adequacy for market risks. A prerequisite for this is that banks must have in place an efficient information system.

Considering the large branch network and the lack of (an adequate) system to collect information required for ALM, which analyzes information on the basis of residual maturity and behavioral pattern, it will take time for banks in the present state to get the requisite information. The problem of ALM needs to be addressed by following an ABC approach, i.e. analyzing the behavior of asset and liability products in the top branches that account for significant business and then making rational assumptions about the way in which assets and liabilities would behave in other branches. In respect of foreign exchange, investment portfolio and money market operations, in view of the centralized nature of the functions, it would be much easier to collect reliable information. The data and assumptions can then be refined over time as the bank management gains experience in conducting business within an ALM framework. The spread of computerization will also help banks in accessing data.

5. ALM Organization

- 5.1 a. Successful implementation of the risk management process would require strong commitment on the part of the senior management in the bank, to integrate basic operations and strategic decision-making with risk management. The Board should have overall responsibility for managing risks and should decide the risk management policy of the bank and set limits for liquidity, interest rate, foreign exchange and equity price risks.
 - b. The Asset-Liability Committee (ALCO) consisting of the bank's senior management including CEO should be responsible for ensuring adherence to the limits set by the Board as well as for deciding the business strategy of the bank (on the assets side and liabilities side) in line with the bank's budget and decided risk management objectives.
 - c. The ALM Support Groups consisting of operating staff should be responsible for analyzing, monitoring and reporting the risk profiles to the ALCO. The staff should also prepare forecasts (simulations) showing the effects of various possible changes in market conditions related to the balance sheet and recommend the action needed to adhere to bank's internal limits.

5.2 The ALCO is a decision-making unit responsible for balance sheet planning from risk-return perspective including the strategic management of interest rate and liquidity risks. Each bank will have to decide on the role of its ALCO, its responsibility as also the decisions to be taken by it. The business and risk management strategy of the bank should ensure that the bank operates within the limits/parameters set by the Board. The business issues that an ALCO would consider, inter alia, will include product pricing for both deposits and advances, desired maturity profile of the incremental assets and liabilities, etc. In addition to monitoring the risk levels of the bank, the ALCO should review the results of and progress in implementation of the decisions made in the previous meetings. The ALCO would also articulate the current interest rate view of the bank and base its decisions for future business strategy on this view. In respect of the funding policy, for instance, its responsibility would be to decide on source and mix of liabilities or sale of assets. Towards this end, it will have to develop a view on future direction of interest rate movements and decide on a funding mix between fixed vs floating rate funds, wholesale vs retail deposits, money market vs capital market funding, domestic vs foreign currency funding, etc. Individual banks will have to decide the frequency for holding their ALCO meetings.

5.3 Composition of ALCO

The size (number of members) of ALCO would depend on the size of each institution, business mix and organizational complexity. To ensure commitment of the Top Management, the CEO/CMD or ED should head the Committee. The Chiefs of Investment, Credit, Funds Management/Treasury (forex and domestic), International Banking and Economic Research can be members of the Committee. In addition, the Head of the Information Technology Division should also be an invitee for building up of MIS and related computerization. Some banks may even have sub-committees and support groups.

5.4 Committee of Directors

The Management Committee of the Board or any other Specific Committee constituted by the Board should oversee the implementation of the system and review its functioning periodically.

5.5 ALM Process

The scope of ALM functions will cover:

- Liquidity risk management
- Management of market risks
- Funding and capital planning
- Profit planning and growth projection
- Trading risk management.

The guidelines given in this note mainly address Liquidity and Interest Rate risks.

6. Liquidity Risk Management

6.1 Measuring and managing liquidity needs are vital activities of commercial banks. By assuring a bank's ability to meet its liabilities as they become due, liquidity management can reduce the probability of developing an adverse situation. The importance of liquidity transcends individual institutions, as liquidity shortfall in one institution can have repercussions on the entire system. Bank management should measure not only the liquidity positions of banks on an on-going basis but also examine how liquidity requirements are likely to evolve under crisis scenarios. Experience shows that assets commonly considered as liquid like Government securities and other money market instruments could also become illiquid when the market players are unidirectional. Therefore, liquidity has to be tracked through maturity or cash
flow mismatches. For measuring and managing net funding requirements, the use of a maturity ladder and calculation of cumulative surplus or deficit of funds at selected maturity dates is adopted as a standard tool. The format of the Statement of Structural Liquidity is given Appendix III.

- 6.2 The Maturity Profile as given in Appendix I could be used for measuring the future cash flows of banks in different time buckets. The time buckets, given the Statutory Reserve cycle of 14 days, may be distributed as under:
 - i. 1 to 14 days
 - ii. 15 to 28 days
 - iii. 29 days and up to 3 months
 - iv. Over 3 months and up to 6 months
 - v. Over 6 months and up to 1 year
 - vi. Over 1 year and up to 3 years
 - vii. Over 3 years and up to 5 years
 - viii. Over 5 years.
- 6.3 The investments in SLR securities and other investments are assumed as illiquid due to lack of depth in the secondary market and are therefore required to be shown under respective maturity buckets, corresponding to the residual maturity. However, some of the banks may be maintaining securities in the 'Trading Book', which are kept distinct from other investments made for complying with the Statutory Reserve Requirements and for retaining relationship with customers. Securities held in the 'Trading Book' are subject to certain preconditions like:
 - i. The composition and volume are clearly defined;
 - ii. Maximum maturity/duration of the portfolio is restricted;
 - iii. The holding period not to exceed 90 days;
 - iv. Cut-loss limit prescribed;
 - v. Defeasance periods (product-wise) i.e., time taken to liquidate the position on the basis of liquidity in the secondary market is prescribed;
 - vi. Marking to market on a daily/weekly basis and the revaluation gain/loss charged to the profit and loss account, etc.

Banks which maintain such 'Trading Books' and complying with the above standards are permitted to show the trading securities under 1-14 days, 15-28 days and 29-90 days buckets on the basis of the defeasance periods. The Board/ALCO of the banks should approve the volume, composition, holding/defeasance period, cut-loss, etc., of the 'Trading Book' and copy of the policy note thereon should be forwarded to the Department of Banking Supervision, RBI.

Within each time-bucket, there could be mismatches depending on cash inflows and outflows. While the mismatches up to one year would be relevant since these provide early warning signals of impending liquidity problems, the main focus should be on the short-term mismatches viz. 1-14 days and 15-28 days. Banks, however, are expected to monitor their cumulative mismatches (running total) across all time buckets by establishing internal prudential limits with the approval of the Board/Management Committee. The mismatch (negative gap) during 1-14 days and 15-28 days in normal course may not exceed 20 percent of the cash outflows in each time bucket. If a bank, in view of its asset-liability profile and the consequential structural mismatches, needs higher tolerance level, it could operate with higher limit sanctioned by its Board/Management Committee giving reasons on the need for such higher limit. The discretion to allow a higher tolerance level is intended for a temporary period till March 31, 2000.

- 6.4 The Statement of Structural Liquidity (Appendix III) may be prepared by placing all cash inflows and outflows in the maturity ladder according to the expected timing of cash flows. A maturing liability will be a cash outflow while a maturing asset will be a cash inflow. It would be necessary to take into account the rupee inflows and outflows on account of forex operations. While determining the likely cash inflows/outflows, banks have to make a number of assumptions according to their asset-liability profiles. For instance, Indian banks with large branch network can (on the stability of their deposit base as most deposits are rolled-over) afford to have larger tolerance levels in mismatches in the long-term if their term deposit base is quite high. While determining the tolerance levels, the banks may take into account all relevant factors based on their asset-liability base, nature of business, future strategy, etc. The RBI is interested in ensuring that the tolerance levels are determined keeping all necessary factors in view and refined further with experience gained in Liquidity Management.
- 6.5 In order to enable the banks to monitor their short-term liquidity on a dynamic basis over a time horizon spanning from 1-90 days, banks may estimate their short-term liquidity profiles on the basis of business projections and other commitments for planning purposes. An indicative format (Appendix V) for estimating Short-term Dynamic Liquidity is enclosed.
- 7. Currency Risk
- 7.1 Floating exchange rate arrangement has brought in its wake pronounced volatility adding a new dimension to the risk profile of banks' balance sheets. The increased capital flows across free economies following deregulation have contributed to increase in the volume of transactions. Large cross-border flows together with the volatility have rendered the banks' balance sheets vulnerable to exchange rate movements.
- 7.2 Dealing in different currencies brings opportunities as also risks. If the liabilities in one currency exceed the level of assets in the same currency, then the currency mismatch can add value or erode value depending upon the currency movements. The simplest way to avoid currency risk is to ensure that mismatches, if any, are reduced to zero or near zero. Banks undertake operations in foreign exchange like accepting deposits, making loans and advances and quoting prices for foreign exchange transactions. Irrespective of the strategies adopted, it may not be possible to eliminate currency mismatches altogether. Besides, some of the institutions may take proprietary trading positions as a conscious business strategy.
- 7.3 Managing Currency Risk is one more dimension of Asset-Liability Management. Mismatched currency position besides exposing the balance sheet to movements in exchange rate also exposes it to country risk and settlement risk. Ever since the RBI (Exchange Control Department) introduced the concept of end of the day near square position in 1978, banks have been setting up overnight limits and selectively undertaking active day time trading. Following the introduction of "Guidelines for Internal Control over Foreign Exchange Business" in 1981, maturity mismatches (gaps) are also subject to control. Following the recommendations of Expert Group on Foreign Exchange Markets in India (Sodhani Committee) the calculation of exchange position has been redefined and banks have been given the discretion to set-up overnight limits linked to maintenance of capital to risk-weighted assets ratio of 8 percent of open position limit.
- 7.4 Presently, the banks are also free to set gap limits with RBI's approval but are required to adopt Value at Risk (VaR) approach to measure the risk associated with forward exposures. Thus, the open position limits together with the gap limits form the risk management approach to forex operations.

For monitoring such risks banks should follow the instructions contained in Circular A.D. (M.A. Series) No. 52 dated December 27, 1997 issued by the Exchange Control Department.

8. Interest Rate Risk (IRR)

8.1 The phased deregulation of interest rates and the operational flexibility given to banks in pricing most of the assets and liabilities imply the need for the banking system to hedge the Interest Rate Risk. Interest rate risk is the risk where changes in market interest rates might adversely affect a bank's financial condition. The changes in interest rates affect banks in a big way. The immediate impact of changes in interest rates is on bank's earnings (i.e. reported profits) by changing its Net Interest Income (NII). A long-term impact of changing interest rates is on bank's Market Value of Equity (MVE) or Net Worth as the economic value of bank's assets, liabilities and off-balance sheet positions get affected due to variation in market interest rates. The interest rate risk when viewed from these two perspectives is known as 'earnings' perspective and 'economic value' perspective, respectively. The risk from the earnings perspective can be measured as changes in the Net Interest Income (NII) or Net Interest Margin (NIM). There are many analytical techniques for measurement and management of interest rate risk. In the context of poor MIS, slow pace of computerization in banks and the absence of total deregulation, the traditional Gap analysis is considered as a suitable method to measure the Interest Rate Risk in the first place. It is the intention of RBI to move over to modern techniques of Interest Rate Risk measurement like Duration Gap Analysis, Simulation and Value at Risk over time when banks acquire sufficient expertise and sophistication in acquiring and handling MIS.

The Gap or Mismatch risk can be measured by calculating Gaps over different time intervals as at a given date. Gap analysis measures mismatches between rate sensitive liabilities and rate sensitive assets (including off-balance sheet positions). An asset or liability is normally classified as rate sensitive if:

- i. Within the time interval under consideration, there is a cash flow;
- ii. The interest rate resets/reprices contractually during the interval;
- iii. RBI changes the interest rates (i.e., interest rates on Savings Bank Deposits, DRI advances, Export credit, Refinance, CRR balance, etc.) in cases where interest rates are administered; and
- iv. It is contractually prepayable or withdrawable before the stated maturities.
- 8.2 The Gap Report should be generated by grouping rate sensitive liabilities, assets and off-balance sheet positions into time buckets according to residual maturity or next repricing period, whichever is earlier. The difficult task in Gap analysis is determining rate sensitivity. All investments, advances, deposits, borrowings, purchased funds, etc. that mature/repriced within a specified time-frame are interest rate sensitive. Similarly, any principal repayment of loan is also rate sensitive if the bank expects to receive it within the time horizon. This includes final principal payment and interim installments. Certain assets and liabilities are repriced at predetermined intervals and are rate sensitive at the time of repricing. While the interest rates on term deposits are fixed during their currency, the advances portfolio

of the banking system is basically floating. The interest rates on advances could be repriced on any number of occasions, corresponding to the changes in PLR. The Gaps may be identified in the following time buckets:

- i. 1-28 days
- ii. 29 days and up to 3 months
- iii. Over 3 months and up to 6 months
- iv. Over 6 months and up to 1 year
- v. Over 1 year and up to 3 years
- vi. Over 3 years and up to 5 years
- vii. Over 5 years
- viii. Non-sensitive.

The various items of rate sensitive assets and liabilities and off-balance sheet items may be classified as explained in Appendix II and the Reporting Format for interest rate sensitive assets and liabilities is given in Appendix IV.

- 8.3 The Gap is the difference between Rate Sensitive Assets (RSA) and Rate Sensitive Liabilities (RSL) for each time bucket. The positive Gap indicates that it has more RSAs than RSLs whereas the negative Gap indicates that it has more RSLs. The Gap reports indicate whether the institution is in a position to benefit from rising interest rates by having a positive Gap (RSA > RSL) or whether it is in a position to benefit from declining interest rates by a negative Gap (RSL > RSA). The Gap can, therefore, be used as a measure of interest rate sensitivity.
- 8.4 Each bank should set prudential limits on individual Gaps with the approval of the Board/Management Committee. The prudential limits should have a bearing on the total assets, earning assets or equity. The banks may work out Earnings at Risk (EaR) or Net Interest Margin (NIM), based on their views on interest rate movements and fix a prudent level with the approval of the Board/Management Committee.
- 8.5 The RBI will also introduce capital adequacy for market risks in due course.
- 9. General
- 9.1 The classification of various components of assets and liabilities into different time buckets for preparation of Gap reports (Liquidity and Interest Rate Sensitivity) as indicated in Appendices I and II is the benchmark. Banks which are better equipped to reasonably estimate the behavioral pattern, embedded options, rolls-in and rolls-out, etc., of various components of assets and liabilities on the basis of past data/empirical studies could classify them in the appropriate time buckets, subject to approval from the ALCO/Board. A copy of the note approved by the ALCO/Board may be sent to the Department of Banking Supervision.
- 9.2 The present framework does not capture the impact of embedded options, i.e., the customers exercising their options (premature closure of deposits and prepayment of loans and advances) on the liquidity and interest rate risks profile of banks. The magnitude of embedded option risk at times of volatility in market interest rates is quite substantial. Banks should therefore evolve suitable mechanism, supported by empirical studies and behavioral analysis to estimate the future behavior of assets, liabilities and off-balance sheet items to changes in market variables and estimate the embedded options.

Asset-Liability Management in Banks

9.3 A scientifically evolved internal transfer pricing model by assigning values on the basis of current market rates to funds provided and funds used is an important component for effective implementation of ALM System. The transfer price mechanism can enhance the management of margin, i.e., lending or credit spread, the funding or liability spread and mismatch spread. It also helps centralize interest rate risk at one place which facilitates effective control and management of interest rate risk. A well-defined transfer pricing system also provides a rational framework for pricing of assets and liabilities.

Appendix I Maturity Profile – Liquidity

	Head of Account		Classification into Time Buckets				
A.	Out	flows					
1.	Cap	ital, Reserves and Surplus	Ove	r 5 years bucket.			
2.	Savings bank Deposits)		Sav into Cur den vola 1-14 yeas and are roll of p app con Boa	savings Bank and Current Deposits may be classified into volatile and core portions. Savings Bank (10%) an Current (15%) Deposits are generally withdrawable of demand. This portion may be treated as volatile. While volatile portion can be placed in the first time bucket i.e 1-14 days, the core portion may be placed in over 1- years bucket. The above classification of Savings Ban and Current Deposits is only a benchmark. Banks whice are better equipped to estimate the behavioral pattern roll-in and roll-out, embedded options, etc., on the basis of past data/empirical studies could classify them in the appropriate buckets, i.e., behavioral maturity instead of contractual maturity, subject to the approval of the Board/ALCO.			
3.	Term Deposits			Respective maturity buckets. Banks which are better equipped to estimate the behavioral pattern, roll-in and roll-out, embedded options, etc. on the basis of past data/empirical studies could classify the retail deposits in the appropriate buckets on the basis of behavioral maturity rather than residual maturity. However, the wholesale deposits should be shown under respective maturity buckets.			
4.	Certificates of Deposit, Borrowings and Bonds (including Subordinated Debt)		Respective maturity buckets. Where call/put options are built into the issue structure of any instrument/s, the call/put date/s should be reckoned as the maturity date/s and the amount should be shown in the respective time buckets.				
5.	Oth	er Liabilities and Provisions		-			
	i.	Bills Payable	i.	The core component which could reasonably be estimated on the basis of past date and behavioral pattern may be shown under the over 1-3 years time bucket. The balance amount may be placed in 1-14 days bucket.			
	ii.	Interoffice Adjustment	ii.	The net credit balance may be shown in 1-14 days bucket.			
	iii.	Provisions other than for loan loss and depreciation in investments	iii.	Respective buckets depending on the purpose.			
	iv.	Other Liabilities	iv.	Respective maturity buckets. Items not representing cash payables (i.e. income received in advance, etc.) may be placed in over 5 years bucket.			
6.	i.	Export Refinance – Availed		Respective maturity buckets of underlying assets.			
	ii.	Export Refinance – Unavailed		1-14 days bucket.			

	Head of Account	Classification into Time Buckets
В.	Inflows	
1.	Cash	1-14 days bucket.
2.	Balances with the RBI	While the excess balance over the required CRR/SLR may be shown under 1-14 days bucket, the Statutory Balances may be distributed amongst various time buckets corresponding to the maturity profile of DTL with a time lag of 14 days.
3.	Balances with other Banks	
	i. Current Account	 Non-withdrawable portion on account of stipulations of minimum balances may be shown under 1-3 years bucket and the remaining balances may be shown under 1-14 days bucket.
	ii. Money at Call and Short Notice, Term Deposits and other placements	ii. Respective maturity buckets.
4.	Investments (Net of Provisions) ¹	
	i. Approved securities	i. Respective maturity buckets excluding the amount required to be reinvested to maintain SLR corresponding to the DTL profile in various time buckets.
	 ii. Corporate debentures and bonds, PSU bonds, CDs and CPs, Redeemable preference shares, Units of Mutual Funds (close-ended), etc. 	Respective maturity buckets. Investments classified as NPAs should be shown under 3-5 years bucket (sub- standard or over 5 years bucket (doubtful).
	iii. Shares/Units of Mutual Funds (open-ended)	iii. Over 5 years bucket.
	iv. Investmentsin Subsidiaries/ Joint Ventures	iv. Over 5 years bucket.
	v. Securities in the Trading Book	 v. 1-14 days, 15-28 days and 29-90 days according to defeasance periods.
5.	Advances (Performing)	
	i. Bills Purchased and Discounted (including bills under DUPN)	i. Respective maturity buckets.
	ii. Cash Credit/Overdraft (including TOD) and Demand Loan component of Working Capital	ii. Banks should undertake a study at behavioral and seasonal pattern of any ailments based on outstanding and the core and volatile portion should be identified. While the volatile portion could be shown in the near- term maturity buckets, the core portion may be shown under over 1-3 years bucket
	iii. Term Loans	iii. Interim cash flows may be shown under respective maturity buckets.
6.	NPAs (Net of provisions, interest suspense and claims received from ECGC/ DICGC)	
1	i. Sub-standard	i. Over 3-5 years bucket.
	ii. Doubtful and Loss	ii. Over 5 years bucket.
7.	Fixed Assets	Over 5 years bucket.

¹ Provisions may be netted from the gross investments provided provisions are held security-wise. Otherwise, provisions should be shown in over 5 years bucket.

	Head of Account	Classification into Time Buckets
8.	Other Assets	
	i. Inter-office Adjustment	The net debit balance may be shown in 1-14 days bucket. Intangible assets and assets not representing cash receivables may be shown in over 5 years bucket.
	ii. Leased Assets	Interim cash flows may be shown under respective maturity buckets.
C.	Contingent Liabilities/Lines of Credit committed/available and other Inflows/Outflows	
1.	i. Lines of Credit committed from Institutions	i. 1-14 days bucket.
	 Unavailed portion of Cash Credit/ Overdraft/Demand loan component of Working Capital limits (outflow). 	ii. Banks should undertake a study of the behavioral and seasonal pattern of potential availments in the accounts and the amounts so arrived at may be shown under relevant maturity buckets up to 12 months.
2.	Letters of Credit/Guarantees (outflow).	Devolvement of Letters of Credit/Guarantees initially entail cash outflows. Thus, historical trend analysis ought to be conducted on the devolvements and the amounts so arrived at in respect of outstanding letters of credit/guarantees (Net of Margins) should be distributed amongst various time buckets. The assets created out of devolvements may be shown under respective maturity buckets on the basis of probable recovery dates.
3.	Repos/Bills Rediscounted (DUPN)/Swaps INR/USD, maturing forex forward contracts, etc. (outflow/inflow)	Respective maturity buckets.
4.	Interest payable/receivable (outflow/inflow) – Accrued interest which are appearing in the books on the reporting day.	Respective maturity buckets.

Note:

- i. Liability on account of event cash flows i.e., shortfall in CRR balance on reporting Fridays, wage settlement, capital expenditure, etc., which are known to the banks and any other contingency may be shown under respective maturity buckets.
- ii. All overdue liabilities may be placed in the 1-14 days bucket.
- iii. Interest and installments from advances and investments, which are overdue for less than one month, may be placed in the 3-6 months bucket. Further, interest and installments due (before classification as NPAs) may be placed in the 6-12 months bucket without the grace period of one month if the earlier receivables remain uncollected.

D. Financing of Gap

In case the negative gap exceeds the prudential limit of 20 percent of outflows, (1-14 days and 15-28 days), the bank may show by way of a footnote as to how it proposes to finance the gap to bring the mismatch within the prescribed limits. The gap can be financed from market borrowings (call/term), bills rediscounting, repos and deployment of foreign currency resources after conversion into rupees (unswapped foreign currency funds), etc.

	Head of Accounts	Rate Sensitivity and Time Bucket				
Liab	ilities					
1.	Capital, Reserves and Surplus	Non-sensitive				
2.	Current Deposits	Non-sensitive				
3.	Savings Bank Deposits	Sensitive to the extent of interest paying (core) portion. This may be included in the 3-6 months bucket. The non-interest paying portion may be shown in non- sensitive bucket. Where banks can estimate the future behavior/sensitivity of current/savings bank deposits to changes in market variables, the sensitivity so estimated could be shown under appropriate time buckets.				
4.	Term Deposits and Certificates of Deposit	Sensitive and reprices on maturity. The amounts should be distributed to different buckets on the basis of remaining maturity. However, in case of floating term deposits, the amounts may be shown under the tim bucket when deposits contractually become due for repricing.				
5.	Borrowings - Fixed	Sensitive and reprices on maturity. The amounts should be distributed to different buckets on the basis or remaining maturity.				
6.	Borrowings – Floating	Sensitive and reprices when interest rate is reset. The amounts should be distributed to the appropriate bucket which refers to the repricing date.				
7.	Borrowings - Zero Coupon	Sensitive and reprices on maturity. The amounts should be distributed to the respective maturity buckets.				
8.	Borrowings from the RBI	Up to 1 month bucket.				
9.	Refinances from other agencies	a. Fixed Rate: As per respective maturity.				
		b. Floating Rate: Reprices when interest rate is reset.				
10.	Other Liabilities and Provisions					
	i. Bills Payable	i. Non-sensitive				
	ii. Inter-office Adjustment	ii. Non-sensitive				
	iii. Provisions	iii. Non-sensitive				
	iv. Others	iv. Non-sensitive.				
11.	Repos/Bills Rediscounted (DUPN), Swaps (Buy/Sell), etc.	Reprices only on maturity and should be distributed to the respective maturity buckets.				
Asse	ts					
1.	Cash	Non-sensitive				
2.	Balances with the RBI	Interest earning portion may be shown in 3-6 months bucket. The balance amount is non-sensitive.				
3.	Balances with other Banks					
	i. Current Account	i. Non-sensitive				
	Money at Call and Short Notice, Term Deposits and other placements	ii. Sensitive on maturity. The amounts should be distributed to the respective maturity buckets.				

Appendix II Interest Rate Sensitivity

	Head of Accounts	Rate Sensitivity and Time Bucket				
4.	Investments (Performing)					
	i. Fixed Rate/Zerocoupon	i.	Sensitive on maturity.			
	ii. Floating Rate	ii.	Sensitive at the next repricing date.			
5.	Shares/Units of Mutual Funds	Non	-sensitive.			
6.	Advances (Performing)					
	i. Bills Purchased and Discounted (including bills under DUPN)	i.	Sensitive on maturity.			
	Cash Credits/Overdrafts (including TODs)/ Loans repayable on Demand and Term Loans	ii.	Sensitive only when PLR/risk premium is changed. Of late, frequent changes in PLR have been noticed. Thus, each bank should foresee the direction of interest rate movements of funding options and capture the amounts in the respective maturity buckets which coincides with the time taken by banks to effect changes in PLR in response to changes in market interest rates.			
7.	NPAs (Advances and Investments) ¹					
	i. Sub-standard	i.	Over 3-5 years bucket			
	ii. Doubtful and Loss	ii.	Over 5 years bucket.			
8.	Fixed Assets	Non	-sensitive.			
9.	Other Assets					
	i. Inter-office Adjustment	i.	Non-sensitive.			
	ii. Leased Assets	ii.	Sensitive on cash flows. The amounts should be distributed to the respective maturity buckets corresponding to the cash flow dates.			
	iii. Others	iii.	Non-sensitive.			
10.	Reverse Repos, Swaps (Sell/Buy), Bills Rediscounted (DUPN)	Sens	itive on maturity.			
11.	Other products (Interest Rate)					
	i. Swaps	i.	Sensitive and should be distributed under different buckets with reference to maturity.			
	ii. Other Derivatives	ii.	Should be suitably classified as and when introduced.			

¹ Amounts to be shown net of provisions.

Appendix III Statement of Structural Liquidity

Name of the Bank _____

Statement of Structural Liquidity as on _____

						Res	sidual Matu	rity			
OU	TFLC	WS	1-14 days	15-28 days	29 days to 3 months	Over 3 months and up to 6 months	Over 6 months and up to 1 year	Over 1 year and up to 3 years	Over 3 years and up to 5 years	Over 5 years	Total
1.	Cap	pital									
2.	Res	erves & Surplus									
3.	Dep	posits	ххх	ххх	ххх	ххх	ххх	xxx	ххх	xxx	ххх
	i.	Current Deposits									
	ii.	Savings Bank Deposits									
	iii.	Term Deposits									
	iv.	Certificates of Deposit									
4.	Bor	rowings	ххх	ххх	ххх	ххх	ххх	ххх	ххх	xxx	ххх
	i.	Call and Short Notice									
	ii.	Interbank (Term)									
	iii.	Refinances									
	iv.	Others (specify)									
5.	Oth	er Liabilities & Provisions	ххх	ххх	ххх	ххх	ххх	xxx	xxx	xxx	ххх
	i.	Bills Payable									
	ii.	Inter-office Adjustment									
	iii.	Provisions									
	iv.	Others									
6.	Line	es of Credit committed to	ххх	ххх	xxx	ххх	ххх	ххх	ххх	xxx	xxx
	i.	Institutions									
	ii.	Customers									
7.	Una Cre Loa Cap	availed portion of Cash dit/ Overdraft/Demand n component of Working ital									
8.	Lett	ers of Credit/Guarantees									
9.	Rep	005									
10.	Bills	Rediscounted (DUPN)									
11.	Swa forv	aps (Buy/Sell)/maturing vards									
12.	Inte	rest payable									
13.	Oth	ers (specify)									
A.	Tot	al Outflows									

(Amount in Crore of Rupees)

(Amount in Crore of Rupees)

Residual Maturity											
0U ⁻	TFLC	ows	1-14 days	15-28 days	29 days to 3 months	Over 3 months and up to 6 months	Over 6 months and up to 1 year	Over 1 year and up to 3 years	Over 3 years and up to 5 years	Over 5 years	Total
INF	LOW	'S									
1.	Cas	sh									
2.	Bal	ances with RBI									
3.	Bal	ances with other Banks	ххх	ххх	ххх	xxx	ххх	xxx	ххх	ххх	xxx
	i.	Current Account									
	ii.	Money at Call and Short Notice, Term Deposits and other placements									
4.	Inve those exc	estments (including se under Repos but luding Reverse Repos)									
5.	Adv	ances (Performing)	ххх	ххх	ххх	xxx	ххх	ххх	ххх	ххх	ххх
	i.	Bills Purchased and Discounted (including bills under DUPN)									
	ii.	Cash Credits, Overdrafts and Loans repayable on demand									
	iii.	Term Loans									
6.	NP/ Inve	As (Advances and estments) ¹									
7.	Fixe	ed Assets									
8.	Oth	er Assets	XXX	XXX	XXX	XXX	XXX	Ххх	ххх	XXX	ххх
	i.	Inter-office Adjustment									
	ii.	Leased Assets									
	iii.	Others									
9.	Rev	verse Repos									
10.	Swa forv	aps (Sell/Buy)/maturing vards									
11.	Bill	s Rediscounted (DUPN)									
12.	Inte	erest Receivable									
13.	Cor	mmitted Lines of Credit									
14.	Exp	oort Refinance from the RBI									
15.	Oth	ers (Specify)									
В.	Tot	al Inflows									
C.	Mis	smatch (B – A)									
D.	Cu	mulative Mismatch									
E.	Сa	s % to A									

1 Net provisions, interest suspense and claims received from ECG/DICGC.

Appendix IV Statement of Interest Rate Sensitivity

Name of the Bank _____

Statement of Interest Rate Sensitivity as on _____

									(Amount	in Crores of	Rupees
						Interes	at Rate Sensitiv	/ity			
		Liabilities	Up to 1 month	1-3 months	Over 3 months up to 6 months	Over 6 months and up to 1 year	Over 1 year and up to 3 years	Over 3 years and up to 5 years	Over 5 years	Non- sensitive	Total
1.	Сар	ital									
2.	Res	erves & Surplus									
3.	Dep	oosits	xxx	XXX	ххх	XXX	ххх	xxx	XXX	xxx	ххх
	i.	Current Deposits									
	ii.	Savings Bank Deposit									
	iii.	Term Deposits									
	iv.	Certificates of Deposit									
4.	Bori	rowings	xxx	xxx	xxx	ххх	ххх	ххх	xxx	XXX	xxx
	i.	Call and Short Notice									
	ii.	Inter-bank (Term)									
	iii.	Refinances									
	iv.	Others (Specify)									
5.	Oth Prov	er Liabilities & visions	ххх	XXX	ххх	ххх	ххх	ххх	ххх	ХХХ	ХХХ
	i.	Bills Payable									
	ii.	Inter-office Adjustment									
	iii.	Provisions*									
	iv.	Others									
6.	Rep	OS									
7.	Bills	Rediscounted (DUPN)									
8.	Swa	aps (Buy/Sell)									
9.	Oth	ers (specify)									
4. 1	otal	Liabilities									
Ass	sets										
1.	Cas	h									
2.	Bala	ances with RBI									
3.	Bala	ances with other Banks	xxx	xxx	xxx	ххх	xxx	xxx	xxx	xxx	ххх
	i.	Current Account									
	ii.	Money at Call and Short Notice, Term Deposits and other placements									
4.	Inve	estments									
	(inc but	luding those under Repos excluding Reverse Repos)									
5.	Adv	ances (Performing)	XXX	XXX	xxx	xxx	xxx	xxx	xxx	xxx	ххх
	i.	Bills Purchased and Discounted (including bills under DUPN)									
	ii.	Cash Credits, Overdrafts and Loans repayable on Demand									
	iii.	Term Loans									

	Interest Rate Sensitivity										
		Assets	Up to 1 month	1-3 months	Over 3 months and up to 6 months	Over 6 months and up to 1 year	Over 1 year and up to 3 years	Over 3 years and up to 5 years	Over 5 years	Non- sensitive	Total
6.	NP. Inv	As (Advances and estments)									
7.	Fix	ed Assets									
8.	Oth	er Assets	ххх	XXX	ххх	xxx	ххх	XXX	ххх	Ххх	ххх
	i.	Inter-office adjustment									
	ii.	Leased Assets									
	iii.	Others									
9.	Re	verse Repos									
10.	Sw	aps (Sell/Buy)									
11.	Bill	s Rediscounted (DUPN)									
12.	Oth	ers (specify)									
В.	Tot	al Assets									
C.	Ga	p (B – A)									
Oth	er Pr	oducts (Interest Rate)	XXX	XXX	ххх	ххх	ххх	XXX	ххх	xxx	ххх
	i.	FRAs									
	ii.	Swaps									
	iii.	Futures									
	iv.	Options									
	v.	Others									
D.	Tot	al other products									
E.	Net	t Gap (C – D)									
F.	Cu	mulative Gap									
G.	Ea	s % to B									

* Amounts to be shown net of provisions, interest suspense and claims received from ECGC/DICGC.

1 Excluding provisions for non-performing advances and investments.

Appendix V

Statement of Short-term Dynamic Liquidity

Name of the Bank ____

Statement of Short-term Dynamic Liquidity as on _____

(Amount in Crores of Rupees)

	A. Outflows			
		1-14 days	15-28 days	29-90 days
1.	Net increase in loans and advances			
2.	Net increase in investments:			
	i. Approved securities			
	ii. Money market instruments (other than Treasury Bills)			
	iii. Bonds/Debentures/Shares			
	iv. Others			
3.	Interbank obligations			
4.	Off-balance sheet items (Repos, swaps, bills discounted, etc.)			
5.	Others			
	Total Outflows			
	B. Inflows			
1.	Net cash position			
2.	Net increase in deposits (less CRR obligations)			
3.	Interest on investments			
4.	Interbank claims			
5.	Refinance eligibility (Export credit)			
6.	Off-balance sheet items (Reverse repos, swaps, bills discounted, etc.)			
7.	Others			
	Total inflows			
	C. Mismatch (B – A)			
	D. Cumulative mismatch			
	E. C as a % to total outflow			

Annexure II

Reserve Bank Guidelines for Risk Management System in Banks

According to the RBI guidelines the management of credit risk should receive the prime attention of the top management. The banks should put in place their loan policy, approved by the board of directors covering the methodologies for measurement, monitoring and control of credit risk. Banks should also evolve comprehensive risk rating system that serves as a single point indicator of diverse risk factors of counterparties in relation to credit and investment decisions. The Reserve Bank guidelines have stated that the activities of Asset-Liability Management Committee and Credit Policy Committee for management of credit and market risks need to be integrated.

The guidelines also require banks to evaluate portfolio quality on an on going basis rather than near about balance sheet date. The proposals for investment should be subjected to the same degree of credit risk analysis as loan proposals. The risk evaluation should also include total exposure, including investments. As regards off-balance sheet exposures, the current and potential credit exposures may be measured on a daily basis. Banks have also been asked to evolve a suitable framework to provide a centralized overview of the aggregate exposure on other banks' endeavor to develop an internal matrix that reckons the counterparty and country risks. To manage liquidity risk, banks have been asked to consider putting in place prudential limits on inter-bank borrowings, especially call fundings, purchased funds, core deposits to core assets, off-balance sheet commitments, swapped funds, etc.

Banks have been asked to evaluate liquidity profile under bank-specific and market crisis scenarios. They have also been asked to prepare contingency plans to measure the ability to withstand sudden adverse swings in liquidity conditions. Banks have been asked to fix a definite timeframe for moving over to Value at Risk (VaR) and duration approaches for measurements of interest rate risk. The guidelines also mention that it would be desirable to adopt international standards on providing explicit capital cushion for the market risk to which banks are exposed. Banks should also adopt proper systems for measurement, monitoring and control of operational risk that is emerging in the wake of phenomenal increase in the volume of financial transactions. Banks operating in international markets have been asked to develop by March 31, 2001 suitable methodologies for estimating and maintaining economic capital. Other banks have also been asked to formulate a medium-term strategy to comply with these requirements.

The guidelines on risk management have placed the primary responsibility of laying down risk parameters and establishing the risk management and control system on the board of directors. They have, however, stated that the implementation of the integrated risk management could be assigned to a risk management committee or a committee of top executives that reports to the board. The risk management guidelines also require banks to constitute a high level credit policy committee to deal with issues pertaining to credit sanction disbursement and follow-up procedures and to manage and control credit risk on a whole bank basis. The Reserve Bank has further asked banks to concurrently set up an independent credit risk management department to enforce and monitor compliance of the risk parameters and prudential limits set by the board/credit policy committee.

The Reserve Bank has, however, stated that due to the diversity and varying size of balance sheet items between banks, it may neither be possible nor necessary to adopt a uniform risks management system. The design or risk management framework should, therefore, be oriented towards the bank's own requirement dictated by the size and complexity of business, risk philosophy, market perception and the existing level of capital. In other words, banks can evolve their own systems compatible with the type and size of operations as well as risk perception. While doing so, banks may critically evaluate their existing risk management system in the light of the guidelines issued by the Reserve Bank and put in place a proper system for covering the existing deficiencies and requisite upgradation. The Reserve Bank has also asked banks to place the circular together with the guidelines before the board of directors at its next meeting. The bank should identify the gaps in the existing risk management practices and the policies and strategies for complying with the guidelines. The bank should identify the gaps in the existing risk management practices and the policies and strategies for complying with the guidelines. The bank should report to the board the progress in implementation of the guidelines at half-yearly intervals.

Annexure III

Guidelines for ALM System in Financial Institutions

In the normal course, FIs are exposed to credit and market risks in view of the asset-liability transformation. With liberalization of Indian financial markets over the last few years and growing integration of domestic markets with external markets, the risks, particularly the market risks, associated with Financial Institutions (FIs) operations have become complex and large, requiring strategic management. The FIs are operating in a fairly deregulated environment and are required to determine interest rates on various products in their liabilities and assets portfolios, both in domestic as well as foreign currencies, on a dynamic basis. Intense competition for business involving both the assets and liabilities, together with increasing volatility in the domestic interest rates as also in foreign exchange rates, has brought pressure on the management of FIs to maintain a good balance amongst spreads, profitability and long-term viability. These pressures call for structured and comprehensive measures for institutionalizing an integrated risk management system and not just an ad hoc action. The FIs are exposed to several major risks in course of their business generally classified as credit risk, market risk and operational risk which underline the need for effective risk management systems in FIs. The FIs need to address these risks in a structured manner by upgrading the quality of their risk management and adopting more comprehensive ALM practices than has been done hitherto.

The envisaged ALM system seeks to introduce a formalized framework for management of market risks through measuring, monitoring and managing liquidity, exchange rate and interest rate risks of a FI that need to be closely integrated with the FI's business strategy. This note lays down broad guidelines for FIs in respect of liquidity, exchange rate and interest rate risk management systems which form part of the ALM function. The initial focus of the ALM function would be to enforce the discipline of market risk management viz. managing business after assessing the market risks involved. The objective of good risk management systems should be to evolve into a strategic tool for effective management of FIs.

The ALM process rests on three pillars. They are -

- ALM Information System
 - Management Information System
 - Information availability, accuracy, adequacy and expediency
- ALM Organization
 - Structure and responsibilities
 - Level of top management involvement
- ALM Process
 - Risk parameters
 - Risk identification
 - Risk measurement
 - Risk management
 - Risk policies and tolerance levels.

ALM Information System

ALM has to be supported by a management philosophy which clearly specifies the risk policies and tolerance limits. This framework needs to be built on sound methodology with necessary supporting information system, as the central element of the entire ALM exercise is the availability of adequate and accurate information

with experience. Thus, information is the key to the ALM process. There are various methods prevalent worldwide for measuring risks. These range from the simple Gap Statement to extremely sophisticated and data intensive Risk Adjusted Profitability Measurement methods. The present guidelines would require comparatively simpler information system for generating liquidity gap and interest rate gap reports.

ALM Organization

Successful implementation of the risk management process would require strong commitment on the part of the senior management in the FI, to integrate basic operations and strategic decision-making with risk management. The Board should have overall responsibility for management of market risks and should decide the risk management policy of the FI and set limits for liquidity, interest rate, exchange rate and equity price risks.

The ALCO is a decision-making unit, consisting of the FI's senior management including CEO, responsible for integrated balance sheet management from risk-return perspective including the strategic management of interest rate and liquidity risks. While each FI will have to decide the role of its ALCO, its powers and responsibilities as also the decisions to be taken by it; its responsibilities would normally include:

- Monitoring the market risk levels of the FI by ensuring adherence to the various risk-limits set by the Board;
- Articulating the current interest rate view and a view on future direction of interest rate movements and base its decisions for future business strategy on this view as also on other parameters considered relevant;
- Deciding the business strategy of the FI, both on the assets and liabilities sides, consistent with the FIs interest rate view, budget and pre-determined risk management objectives. This would, in turn, include:
 - determining the desired maturity profile and mix of the assets and liabilities;
 - product pricing for both, assets as well as liabilities side;
- Deciding the funding strategy i.e., the source and mix of liabilities or sale of assets; the proportion of fixed vs. floating rate funds, wholesale vs. retail funds, money market vs. capital market funding, domestic vs. foreign currency funding, etc.
- Reviewing the results of and progress in implementation of the decisions made in the previous meetings.

The ALM Support Groups consisting of operating staff should be responsible for analyzing, monitoring and reporting the risk profiles to the ALCO. The staff should also prepare forecasts (simulations) reflecting the impact of various possible changes in market conditions on the balance sheet and recommend the action needed to adhere to FI's internal limits.

Composition of ALCO: The size (number of members) of ALCO would depend on the size of each institution, business mix and organizational complexity. To ensure commitment of the Top Management and timely response to market dynamics, the CEO/CMD/DMD or the ED should head the Committee. Though the composition of ALCO could vary across the FIs as per their respective set-up and business profile, it would be useful to have the Chiefs of Investment, Credit, Resources Management or Planning, Funds Management/Treasury (forex and domestic), International Business and Economic Research as the members of the Committee. In addition, the Head of the Technology Division should also be an invitee for building up of MIS and related computerization. Some FIs may even have Sub-committees and Support Groups.

Committee of Directors: The Management Committee of the Board or any other Specific Committee constituted by the Board should oversee the implementation of the ALM system and review its functioning periodically.

ALM Process

The scope of ALM function can be described as follows:

- Liquidity risk management
- Management of market risks
- Trading risk management
- Funding and capital planning
- Profit planning and growth projection.

The guidelines contained in this note mainly address Liquidity and Interest Rate risks.

Liquidity Risk Management: Measuring and managing liquidity needs are vital for effective operation of FIs. By assuring an FI's ability to meet its liabilities as they become due, liquidity management can reduce the probability of an adverse situation developing. The importance of liquidity transcends individual institutions, as liquidity shortfall in one institution can have repercussions on the entire system. FIs management should measure not only the liquidity positions of FIs on an on-going basis but also examine how liquidity requirements are likely to evolve under different assumptions. Experience shows that assets commonly considered to be liquid, such as Government securities and other money market instruments, could also become illiquid when the market and players are unidirectional. Therefore, liquidity has to be tracked through maturity or cash flow mismatches. For measuring and managing net funding requirements, the use of a maturity ladder and calculation of cumulative surplus or deficit of funds at selected maturity dates is adopted as a standard tool.

The Maturity Profile could be used for measuring the future cash flows of FIs in different time buckets. The time buckets may be distributed as under:

- 1 to 14 days
- 15 to 28 days
- 29 days and up to 3 months
- Over 3 months and up to 6 months
- Over 6 months and up to 1 year
- Over 1 year and up to 3 years
- Over 3 years and up to 5 years
- Over 5 years and up to 7 years
- Over 7 years and up to 10 years
- Over 10 years.

The investments are assumed as illiquid due to lack of depth in the secondary market and are, therefore, generally shown, as per their residual maturity, under respective time buckets. However, some of the FIs may be maintaining securities in the Trading Book, which are kept distinct from other investments made for retaining relationship with customers. Securities held in the Trading Book should be subject to the following preconditions:

- The composition and volume of the Trading Book should be clearly defined.
- Maximum maturity/duration of the trading portfolio should be restricted.
- The holding period of the trading securities should not exceed 90 days.

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- Cut-loss limit(s) should be prescribed.
- Product-wise defeasance periods (i.e., the time taken to liquidate the position on the basis of liquidity in the secondary market) should be prescribed.
- Such securities should be marked-to-market on a daily/weekly basis and the revaluation gain/loss should be charged to the profit and loss account.

The FIs which maintain such Trading Books consisting of securities that comply with the above standards are permitted to show the trading securities under 1-14 days, 15-28 days and 29-90 days time buckets on the basis of the defeasance periods. The Board/ALCO of the banks should approve the volume, composition, maximum maturity/duration, holding/defeasance period, cut-loss limits, etc. of the Trading Book. The FIs, which are better equipped, will have the option of evolving with the approval of the Board/ALCO, an integrated Value at Risk (VaR) limit for their entire balance sheet including the "Banking Book" and the "Trading Book", for the rupee as well as foreign currency portfolio. A copy of the approved policy note in this regard, should be forwarded to the Department of Banking Supervision, FID, and the RBI.

Within each time bucket there could be mismatches depending on cash inflows and outflows. While the mismatches up to one year would be relevant since these provide early warning signals of impending liquidity problems, the main focus should be on the short-term mismatches viz., 1-14 days and 15-28 days. FIs, however, are expected to monitor their cumulative mismatches (running total) across all time buckets by establishing internal prudential limits with the approval of the Board/ALCO. The negative gap during 1-14 days and 15-28 days time buckets, in normal course, should not exceed 10 percent and 15 percent respectively, of the cash outflows in each time bucket. If a FI in view of its current asset-liability profile and the consequential structural mismatches needs higher tolerance level, it could operate with higher limit sanctioned by its Board/ALCO giving specific reasons on the need for such higher limit. The discretion to allow a higher tolerance level was intended for a temporary period initially. While determining the tolerance levels, the FIs may take into account all relevant factors based on their asset-liability base, nature of business, future strategy, etc. The RBI is interested in ensuring that the tolerance levels are determined keeping all necessary factors in view and further refined with experience gained in Liquidity Management.

The Statement of Liquidity may be prepared by placing all cash inflows and outflows in the maturity ladder according to the expected timing of cash flows. A maturing liability will be a cash outflow while a maturing asset will be a cash inflow. It would also be necessary to take into account the rupee inflows and outflows on account of forex operations. Thus, the foreign currency resources raised abroad but swapped into rupees and deployed in rupee assets, would be reflected in the rupee liquidity statement. Some of the FIs have the practice of disbursing rupee loans to their exporter clients but denominate such loans in foreign currency in their books which are extinguished by the export proceeds. Such foreign currency denominated loans too would be a part of rupee liquidity statement since such loans are created out of rupee resources. As regards the foreign currency loans granted out of foreign currency resources on a back-to-back basis, a currency-wise liquidity statement for each of the foreign currencies in which liabilities and assets have been created, will need to be prepared.

Currency Risk: Floating exchange rate arrangement has brought in its wake pronounced volatility adding a new dimension to the risk profile of FIs' balance sheets. The increased capital flows across free economies following deregulation have contributed to increase in the volume of transactions. Large cross border flows together with the volatility has rendered the FIs' balance sheets vulnerable to exchange rate movements.

Dealing in different currencies brings opportunities as also risks. If the liabilities in one currency exceed the level of assets in the same currency, then the currency mismatch can add value or erode value depending upon the currency movements. Mismatched currency position, besides exposing the balance sheet to movements in exchange rate, also exposes it to country risk and settlement risk. FIs undertake operations in foreign exchange such as borrowings and making loans in foreign currency, which exposes them to currency or exchange rate risk. The simplest way to avoid currency risk is to ensure that mismatches, if any, are reduced to zero or near zero. However, irrespective of the strategies adopted, it may not be possible to eliminate currency mismatches altogether.

At present, only five FIs (viz. EXIM Bank, ICICI, IDBI, IFCI and IIBI) have been granted by RBI (ECD) restricted authorization to deal in foreign exchange under FERA 1973 while other FIs are not authorized to deal in foreign exchange. The FIs are therefore, unlike banks, not subject to the full rigour of the reporting requirements under Exchange Control regulations. Hence, the MAP and SIR statements prescribed for banks vide AD (MA Series) circular no. 52 dated 27 December, 1997 issued by RBI (ECD), are not applicable to FIs. In order, however, to capture the liquidity and interest rate risk inherent in the foreign currency portfolio of the FIs, it would be necessary to compile, on an on-going basis, currency-wise Statement of Liquidity and IRS Statement, separately for each of the currencies in which the FIs have an exposure.

Interest Rate Risk (IRR): Interest rate risk is the risk where changes in market interest rates might adversely affect an FI's financial condition. The immediate impact of changes in interest rates is on FI's earnings (i.e. reported profits) by changing its Net Interest Income (NII). A long-term impact of changing interest rates is on FI's Market Value of Equity (MVE) or Net Worth as the economic value of bank's assets, liabilities and off-balance sheet positions get affected due to variation in market interest rates. The interest rate risk when viewed from these two perspectives is known as earnings perspective and economic value perspective, respectively. The risk from the earnings perspective can be measured as changes in the Net Interest Income (NII) or Net Interest Margin (NIM). There are many analytical techniques for measurement and management of Interest Rate Risk. In the context of poor MIS, slow pace of computerization in FIs, the traditional Gap analysis is considered to be a suitable method to measure the Interest Rate Risk in the initial phase of the ALM system. However, the FIs, which are better equipped, would have the option of deploying advanced IRR management techniques with the approval of their Board/ALCO, in addition to the Gap Analysis prescribed under the guidelines. It is the intention of the RBI to move over to the modern techniques of Interest Rate Risk measurement like Duration Gap Analysis, Simulation and Value at Risk over time when FIs acquire sufficient expertise and sophistication in acquiring and handling MIS.

The Gap or Mismatch risk can be measured by calculating Gaps over different time intervals as at a given date. Gap analysis measures mismatches between rate sensitive liabilities and rate sensitive assets (including off-balance sheet positions). An asset or liability is normally classified as rate sensitive if:

- Within the time interval under consideration, there is a cash flow
- The interest rate resets/reprices contractually during the interval
- It is contractually pre-payable or withdrawable before the stated maturities
- It is dependent on the changes in the Bank Rate by the RBI.

The Gap Report should be generated by grouping rate sensitive liabilities, assets and off-balance sheet positions into time buckets according to residual maturity or next re-pricing period, whichever is earlier. All investments, advances, deposits, borrowings, purchased funds, etc. that mature/re-price within a specified time-frame are interest rate sensitive. Similarly, any principal repayment of loan is

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also rate sensitive if the FI expects to receive it within the time horizon. This includes final principal repayment and interim installments. Certain assets and liabilities carry floating rates of interest that vary with a reference rate and hence, these items get repriced at predetermined intervals. Such assets and liabilities are rate sensitive at the time of repricing. While the interest rates on term deposits and bonds are generally fixed during their currency, the interest rates on advances could be repriced any number of occasions, on the predetermined reset/repricing dates and the new rate would normally correspond to the changes in PLR.

The interest rate gaps may be identified in the following time buckets:

- 1-28 days
- 29 days and up to 3 months
- Over 3 months and up to 6 months
- Over 6 months and up to 1 year
- Over 1 year and up to 3 years
- Over 3 years and up to 5 years
- Over 5 years and up to 7 years
- Over 7 years and up to 10 years
- Over 10 years
- Non-sensitive.

The various items of rate sensitive assets and liabilities and off-balance sheet items may be classified into various time-buckets.

The Gap is the difference between Rate Sensitive Assets (RSA) and Rate Sensitive Liabilities (RSL) for each time bucket. The positive Gap indicates that it has more RSAs than RSLs whereas the negative Gap indicates that it has more RSLs. The Gap reports indicate whether the institution is in a position to benefit from rising interest rates by having a positive Gap (RSA > RSL) or whether it is in a position to benefit from declining interest rates by a negative Gap (RSL < RSA). The Gap can, therefore, be used as a measure of interest rate sensitivity.

Each FI should set prudential limits on interest rate gaps in various time buckets with the approval of the Board/ALCO. Such prudential limits should have a relationship with the Total Assets, Earning Assets or Equity. In addition to the interest rate gap limits, the FIs which are better equipped would have the option of setting the prudential limits in terms of Earnings at Risk (EaR) or Net Interest Margin (NIM) based on their views on interest rate movements with the approval of the Board/ALCO.

General

The classification of various components of assets and liabilities into different time buckets for preparation of Gap reports (Liquidity and Interest Rate Sensitivity) is the benchmark. The FIs which are better equipped to reasonably estimate the behavioral pattern, embedded options, rolls-in and rolls-out, etc., of various components of assets and liabilities on the basis of past data/empirical studies could classify them in the appropriate time buckets, subject to approval from the ALCO/Board. A copy of the note approved by the ALCO/Board may be sent to the Department of Banking Supervision, Financial Institutions Division.

The impact of embedded options (i.e., the customers exercising their options for premature closure of term deposits, premature encashment of bonds and prepayment of loans and advances) on the liquidity and interest rate risks profile of FIs and the magnitude of embedded option risk during the periods of volatility in market interest rates, is quite substantial. The FIs should therefore evolve

suitable mechanism, supported by empirical studies and behavioral analysis, to estimate the future behavior of assets, liabilities and off-balance sheet items to changes in market variables and estimate the impact of embedded options. In the absence of adequate historical database, the entire amount payable under the embedded options should be slotted as per the residual period to the earliest exercise date.

A scientifically evolved internal transfer pricing model by assigning values on the basis of current market rates to funds provided and funds used is an important component for effective implementation of ALM System. The transfer price mechanism can enhance the management of margin i.e., lending or credit spread, the funding or liability spread and mismatch spread. It also helps centralizing interest rate risk at one place which facilitates effective control and management of interest rate risk. A well defined transfer pricing system also provides a rational framework for pricing of assets and liabilities.

<u>Chapter X</u> Derivatives in Banks

After reading this chapter, you will be conversant with:

- Futures in Banks and Different Types of Futures
- Options in Banks and Different Types of Options
- Swaps in Banks and Different Types of Swaps
- Use of the Different Derivative Products
- Credit Derivatives

HISTORY OF DERIVATIVES

In this era of globalization, we are witnessing innovations in financial engineering, which result in the evolution of a new set of products in the banking and financial sector named derivatives. The growth of these products in the last 20 years has been one of the most extraordinary and important features of the financial market place. Although commodity forwards and futures have been traded actively since the turn of the century and historians find antecedents for the options contracts in ancient Greek writings, until 1972, the market for modern derivatives was not born.

Towards the end of the second world war, representatives of 44 nations gathered in 1944 in Bretton Woods town in New Hampshire, USA and agreed on a fixed exchange rate system which lasted till the early 1970s. Under that system, the exchange rates of all currencies were fixed against the US dollar. As the US dollar was then convertible to gold at \$35 per ounce, all currencies were indirectly fixed in terms of gold. In 1973, the Bretton Woods Agreement, the pact that instituted a fixed exchange-rate regime for the world's major nations, effectively collapsed when the US suspended the dollar's convertibility into gold. This resulted in increase of exchange rate and interest rate volatility.

Two months before the collapse of Bretton Woods system, the Chicago Mercantile Exchange (CME) launched the world's first exchange-traded currency futures. In 1975, interest rate futures contracts started on GNMA CDRs (Government Nation Mortgage Association Certificates of Deposit Rollover) on the Chicago Board of Trade (CBOT) and in the T-Bills on the CME.

The Rise of Derivatives Market

In the 1980s, the process of liberalization and deregulation of the financial markets gained momentum when the British and American leadership led what could perhaps be considered as the world-wide deregulatory movement. While the liberalization drive under the Reagan administration in the USA brought about major changes, London's pre-eminent position in the world's financial arena was further elevated by the "Big-Bang" of 1986, which allowed increased presence of foreign firms. This resulted in what is known as integration and the securitization of the world financial markets. The arrival of Information Technology (IT) facilitated the process of integration on an unprecedented scale. Cross-border activities in finance flourished and the access to different markets in the world increased manifold while transfer of resources from one market to another became rapid and almost cost free.

It was also at this juncture that trends in disintermediation manifested manifold compelling banks to create new products and services. The prescription of Capital Adequacy Norms by the Bank for International Settlement (BIS) resulted in increased costs of loans to banks and as an off-shoot of this development, banks found securitization, an off-balance sheet activity, an attractive route to expand assets. With the integration of the financial markets and free mobility of capital, risks also multiplied and risk diversification came to occupy the center stage. This logically led to the evolution of risk hedging mechanisms, first in the forex markets, later in the other segments of financial service industry and these have come to be known generally as Derivatives.

After emerging in the USA, the derivatives business expanded rapidly and flourished in the European markets. According to a recent estimate, total value of derivatives issued worldwide in 1995 was over \$ 50 trillion¹.

The important developments in the derivatives markets also occurred in the early 1980s. In May 1972, the International Monetary Market on the Chicago Mercantile

Source: BIS.

Derivatives in Banks

Exchange began trading futures contracts on the British pound, Canadian dollar, Deutschemark, Japanese yen and Swiss franc. Currency swaps were next to appear. Option contracts on foreign exchange followed closely on the heels of swaps. In December 1982, the Philadelphia Stock Exchange introduced an option contracts on the British pound. Although exchange-traded options on individual equities were available in the US, it was currency options and futures generally that spurred the development of a whole new generation of risk management techniques and strategies.

Table 1

ISDA Market Survey

Notional amounts outstanding at year-end, all surveyed contracts, 1987-present

Year	Year-end outstanding for interest rate swaps	Year-end outstanding for currency swaps	Year-end outstanding for interest rate options	Total IR and Currency outstanding	Total credit default swap outstandings	Total equity derivative outstandings
	1	2	3	4	5	6
1987 \$	682.80	182.80	\$	865.60		
1988	1,010.20	316.80	327.30	1,654.30		
1989	1,502.60	434.90	537.30	2,474.70		
1990	2,311.54	577.53	561.30	3,450.30		
1991	3,065.10	807.67	577.20	4,449.50		
1992	3,850.81	860.39	634.50	5,345.70		
1993	6,177.35	899.62	1,397.60	8,474.50		
1994	8,815.56	914.85	1,572.80	11,303.20		
1995	12,810.74	1,197.39	3,704.50	17,712.60		
1996	19,170.91	1,059.64	4,722.60	25,453.10		
1997	22,291.33	1,823.63	4,920.10	29,035.00		
1998				50,997.00		
1999				58,265.00		
2000				63,009.00		
2001				69,207.30	918.87	
2002				101,318.49	2,191.57	2,455.29
2003				142,306.92	3,779.40	3,444.08
2004				183,583.27	8,422.26	4,151.29

Notional amounts in billions of US dollars

Source: Copyright @ 2005 by International Swaps and Derivatives Association, Inc.

It is already mentioned that interest rate volatility increased after the collapse of the Bretton Woods system. Figure 1 shows the exchange rate volatility. Due to this, the presence of derivatives products in interest rates and exchange rates also increased. Figure 2 shows the volatility in the US interest rates. Exchange rate volatility was also seen during the same period which was at unprecedented levels by the then standards.





Source: Robert J Schwartz and Clifford W. Smith. Jr; The Handbook of Currency and Interest Rate Risk Management.

Figure 2: First Difference in US Treasury Yield Five Year Constant Maturity



Source: Robert J Schwartz and Clifford W Smith. Jr; The Handbook of Currency and Interest Rate Risk Management.

Cable 2: Futures Contracts Appear on the CBOT and CME						
First Day Trading	Underlying Asset	Exchange				
October, 1975	GNMA	CBOT				
January, 1976	US T-Bills	CME				
August, 1977	US T-Bonds	CBOT				
December, 1981	Eurodollar	CME				
May, 1982	T-Notes	CBOT				
Table 3: Options Contracts Appear on the CBOT and CME						
First Day Trading	Underlying Asset	Exchange				
October, 1982	T.Bond Futures	CBOT				
October, 1982	T.Bond	CBOE				
March, 1985	Eurodollar Futures	CME				
May, 1985	T-Note Futures	CBOT				
July, 1985	T.Note	CBOE				
April, 1986	T.Bill Futures	CME				

Derivatives in Banks

By mid-80s, futures, options, swaps and Forward Rate Agreements (FRAs) had revolutionized financial and commodity risk management. The trading in the derivatives increased many fold. CBOT ran into ten million contracts a year and derivatives exchanges came into existence in many regions: The New York Futures Exchange in 1980, London International Financial Futures Exchange (LIFFE) in 1982, The Singapore International Monetary Exchange (SIMEX) in 1984, The Tokyo Financial Exchange (TFE) in 1985, and French Matif in 1985. Now financial futures account for more than 60 percent of futures traded around the world.²

Table 4³: Annual Volume of Chicago Board of Trade (World's largest derivatives exchange)

(in US\$ millions)

Futures and Options Combined Totals	1994	1995	1996	1997	1998	1999	2000
Agricultural	42,348,484	50,260,845	65,369,379	62,023,609	58,749,036	59,407,848	60,303,460
Financial	177,017,577	160,300,159	156,994,150	179,703,338	218,570,232	190,996,164	169,432,716
Stock Index	-	-	-	911,608	3,812,910	4,125,646	3,772,840
Metals	128,589	107,652	60,222	44,658	49,233	30,974	19,536
Energy	-	-	-	-	272	22	-
Insurance	9,424	3,324	66	-	-	-	
PCS Insurance	-	1,064	14,688	15,706	7,753	561	6
Grand Total	219,504,074	210,673,044	222,438,505	242,698,919	281,189,436	254,561,215	233,528,558

The following is the list of major derivatives exchanges in the world:

Table 5: Major Exchanges throughout the World Trading
Futures and Options, with their Official Abbreviations

Stock Exchanges	Abbreviations
Agrarische Termijnmarkt Amsterdam	ATA
American Stock Exchange	AMEX
Australian Options Market	AQM
Belgian Futures & Options Exchange	BELFOX
Bolsa de Mercadorias e Futuros, Brazil	BM&F
Chicago Board of Trade	CBOT
Chicago Board Options Exchange	CBOE
Chicago Mercantile Exchange	CME
Coffee, Sugar & Cocoa Exchange, New York	CSCE
Commodity Exchange, New York	COMEX
Copenhagen Stock Exchange	FUTOP
Deutsche Termin Borse, Germany (formerly DTB)	EUREX
European Options Exchange	EOE
Financiele Termijnmarkt Amsterdam	FTA
Finnish Options Market	FOM
Hong Kong Futures Exchange	HKFE
International Petroleum Exchange, London	IPE
Irish Futures & Options Exchange	IFOX

² Doreen Soh; "How to invest in commodities, Gold & Currencies" Times Books International.

³ Source: www.CBOT.com

Stock Exchanges	Abbreviations
Kansas City Board of Trade	KCBT
Kobe Rubber Exchange	KRE
Kuala Lumpur Commodity Exchange	KLCE
London Commodity Exchange	LCE
London International Financial Futures & Options Exchange	LIFFE
London Metal Exchange	LME
London Securities and Derivatives Exchange	OMLX
Manila International Futures Exchange	MIFE
Marche a Terme International de France	MATIF
Marche de Options Negociables de Paris	MONEP
MEFF Renta Fija y Variable, Spain	MEFF
Mercado de Futuros y Opciones S.A., Argentina	MERFOX
Mid America Commodity Exchange	MidAm
Minneapolis Grain Exchange	MGE
Montreal Exchange	ME
New York Cotton Exchange	NYCE
New York Futures Exchange	NYFE
New York Mercantile Exchange	NYMEX
New York Stock Exchange	NYSE
New Zealand Futures & Options Exchange	NZFOE
Osaka Grain Exchange	OGE
Osaka Securities Exchange	OSA
OTOB Aktiengesellschaft	OTOB
Pacific Stock Exchange	PSE
Philadelphia Stock Exchange	PHLX
Singapore International Financial Futures Exchange	SIMEX
Stockholm Options Market	OM
Swiss Options and Financial Futures Exchange	SOFFEX
Sydney Futures Exchange	SFE
Tokyo Grain Exchange	TGL
Tokyo International Financial Futures Exchange	TIFFE
Toronto Stock Exchange	TSE
Vancouver Stock Exchange	VSE
Winnipeg Commodity Exchange	WCE

Source: John C Hill, Options, Futures & Other Derivatives, 3rd Edition.

ONGOING DEVELOPMENTS

The process of development in the derivatives market still continues. New contracts come into existence on an ongoing basis in the market every month. New exchanges are opened for business. Over 50 exchanges throughout the world now trade in some form of derivatives or the other. At the same time, the OTC market has developed a vast array of products that can be customized to suit any risk/reward profile in almost every market. All the derivatives products like Swaps, FRAs, Options can now be purchased from a large number of professional market makers and brokers on

different underlying assets. There are also derivatives whose underlying assets themselves are derivatives. One-off transaction has been offered the chance to hedge against the possibility of a Tokyo earthquake.

The development of these markets has enabled institutional investors, bank treasurers and corporate CFOs to manage risks more efficiently and to speculate on them if they wish. Treasurers now have no excuse for unexpected surges in interest expense, translational loss or real exchange losses. Instruments now exist that allow them to fix a budgeted rate, insure against catastrophic rate changes and participate in beneficial movements. Portfolio managers can now execute investment decisions without going to the asset market, which may be illiquid or expensive for an individual market participant. With derivative instruments, corporates can alter or synthesize assets and liabilities, quickly and efficiently without much cost. Now they can express their views on interest rate or exchange rates by entering directly into the market.

Derivative markets are able to bring the dividend and disparate markets together. These markets and instruments have created an efficient system for transfer of risk throughout the global financial system. Market makers became very sophisticated and they are ready to take any kind of risk which a customer wants to hedge. Far from being a destabilizing force, derivative instruments can claim to be having moderating influence on world financial markets, enabling all users of those markets to position themselves according to their views. The derivatives market is now mature. There are now liquid exchange-traded contracts on all the major commodities, currencies and most of the key stock indices. The OTC market offers two-way prices for swap and option products on wider range of underlying assets. A large number of banks, financial institutions and brokers can now offer these services while their structures and uses are well-understood by many corporate treasurers and institutional investors. With this level of maturity, the transaction costs in derivatives markets has come down drastically and arbitrage profit for the traders became negligible. Exchange-traded futures and options for some traders became a 'true' commodity product. The markets are so efficient and transparent that there is little scope for large spreads.

All these derivatives products have been used effectively by treasury managers for hedging risk. Considering the potential profits in these products, the corporates and treasurers began looking at these products for enhancing their profits. Thus speculation on derivatives slowly became an integral part of the treasury function. The most significant feature (and most dangerous too) of the derivatives is that the cash outlay required for taking position is insignificant when compared to the cash outlay required for taking a similar position on the underlying assets.

In the last decade, several major cases of corporate losses were reported in international media due to trading in the derivative markets. Major losers are Barings Bank, Procter & Gamble and Orange County. These incidents brought in their wake a school of thought which concluded that derivatives are adding to the risk rather than helping in hedging the risk. While there may be temptation to agree, an attempt to have a deeper insight will only highlight the need for strong risk management framework including treasury control and the need for scrupulous adherence to the guidelines. The important thing is to understand the products well and have appropriate controls in place. All the mishaps have taken place only because basic controls were not observed. These mishaps have only emphasized the need for adequate infrastructure, controls and reporting system.

Options and Futures are the result of an unrelenting search for better financial instruments. They belong to a class of instruments referred to as 'Derivatives' because they derive their value from an underlying commodity or a financial asset. The underlying commodities and financial assets can range from mundane products like wheat and cotton to precious items like gold, silver, petroleum and financial assets like stocks, bonds and currencies.

MEANING OF FUTURES

Consider yourself as a farmer growing corn. Say, the month running is April, and your crop is likely to harvest in the month of July. There is an uncertainty about the price you will receive for the corn. In the years of low supply or scarcity of corn, you might obtain a relatively high price – especially if you are not in a hurry. In the years of oversupply of corn, you may have to dispose at lower prices. In the latter case, you are exposed to a great deal of risk.

On the other hand, consider a merchant who has an ongoing requirement for corn. In the years of oversupply, he could fetch the corn at a competitive rate. But, in years of scarcity, he is exposed to price risk, as the prices may be highly exorbitant.

As you are uncertain about the price that you are likely to receive, you will be happy if you can know the price you are likely to receive in future with certainty. The futures market will enable you to enter into a contract, and lock the price. 'Futures' contracts are legally binding agreements to buy or sell a commodity sometime in the future. The 'contract' specifies the quantity, price and the date of delivery (negotiable to you and the merchant), and will enable you both to eliminate or minimize the risk, which otherwise will be faced due to uncertain price fluctuations of the future price of corn.

Let us consider an example to understand the concept of futures.

Say, you are a trader in Chicago. In March, you instructed a broker to buy 10,000 bushels of corn futures for July delivery. The broker would immediately pass these instructions on to a trader on the floor of the Chicago Board of Trade (CBOT) (an exchange). Say, at about the same time, another investor, Mr. Kelly, instructs a broker to sell 10,000 bushels of corn futures for July delivery (this example is cited to make you understand the concept. The time and the quantity may not always match). The instructions of Kelly would also be passed on to a trader. The traders would meet, agree on a price to be paid for the corn in July, and the deal would be struck.

Now, you are in 'long futures position', as you agreed to buy. Kelly, who agreed to sell is in 'short futures position'. The act of buying is known as 'going long' and act of selling is known as 'going short'. The 'price agreed to' by the two traders on your behalf to buy and Kelly's behalf to sell on the floor of the exchange is known as the 'futures price'. Suppose the price agreed is 196.50 cents per bushel. The price agreed is arrived or determined just like the price of any other good, i.e., determined by the laws of demand and supply. Say, if at any point of time, there are more traders willing to sell July corn than buy July corn, the price will go down and vice versa.

The prime objective of using future markets is to manage price risk. You can acquire insurance against adverse price changes, by establishing a price now, for items to be delivered later.

The principle underlying hedging (discussed later in this chapter) in the futures market is that one can establish a known price level even weeks or months before futures position protects against the unfavorable price changes before the due date.

Trading in futures market acts as a substitute for cash market transactions, as the former allows one to know about the actual outflow/inflow before hand. On the other hand, price fluctuations are possible in the latter.

The largest futures exchanges in the world are the Chicago Mercantile Exchange (CME) and the Chicago Board of Trade (CBOT). These exchanges will be discussed later in the chapter.

Motives Behind Using Futures

HEDGING

As mentioned above, futures markets were formed originally to meet the needs of farmers and merchants. One can take position solely for the purpose of establishing a known price level – weeks or months in advance – or for either going long or short in the cash market to minimize the risk. An individual who hedges is called the 'Hedger' and the activity of trading in futures to control or reduce risk is called as 'Hedging'.

Let us consider an illustration to understand how the futures market is used for hedging. Suppose it is now June and a manufacturer of cotton apparels needs 2,00,000 pounds of cotton in October 20x1 and is of the opinion that the price would rise. Currently on the New York Cotton Exchange (NYCE) the October cotton no.2 futures are trading at 57.00 cents per pound. He enters into a futures contract for 2,00,000 pounds, for which he will need to buy 4 contracts (a minimum contract size is 50,000 pounds on NYCE) and lock his price at 57.00 cents per pound (i.e. his total outflow in October will be \$1,14,000).

Assume that in October the cash market price of cotton is 58.55 cents per pound. He will have to pay the supplier \$1,17,100 to procure cotton. However, the extra cost of 1.55 cents per pound (\$3,100) which he will have to pay to procure cotton will be offset by a profit of 1.55 cents per pound when the futures contract is sold at 58.55 cents. In other words, hedging provides insurance against an increase in the price. However, had the price of cotton declined instead of rising, he would have incurred a loss on his futures position but this would have been offset by the lower cost of acquiring cotton in the cash market.

HEDGEABLE AND NON-HEDGEABLE RISKS

The futures market has two main types of foreseeable risks:

- Price Risks
- Quantity Risks.

While price risks relate to unexpected changes of prices of a commodity in the future, quantity risks relate to the future output of a commodity. Price risks can be hedged by taking positions in the futures or options markets and the hedging can be quite accurate so as to ensure no losses. Price risks are also known as hedgeable risks. Quantity risks are also known as non-hedgeable risks, as they cannot be accurately quantified and hedged, as quantity output is more an act of God and depends on the outcome of nature.

Basis Risk

The meaning of basis has been discussed above. If the hedge can eliminate the full risk it is a situation known as perfect hedging, but as some uncertainty is associated always with the future and the difference between the spot prices and future prices may change, there are chances of basis risks. In short, basis risk may occur because of imperfect hedging between the spot price of the asset to be hedged and the futures price of the contract used.

Arbitraging

Arbitraging means simultaneous purchase and sale of similar assets in different markets to take advantage of price discrepancy.

Arbitrageurs are third group of participants in these markets. The act of arbitraging involves locking-in riskless profits by simultaneously entering into different transactions in two or more markets.

Consider an IBM stock traded on the NYSE and on LSE. Suppose the stock price is \$155 in NY and 88 pounds in London and the exchange rate is \$1.75 per pound. An arbitrageur could simultaneously buy 100 shares in LSE and sell in NY and make a risk-free profit of

 $100 \ge [155 - (1.75 \ge 88)] = 100.$

Transaction costs would reduce the profit of the arbitrageur to the minimum. As you buy the stock on the London Exchange the demand will increase. Similarly, the price at NYSE will fall as they sell the stock, reducing the arbitraging opportunities. In short, arbitrage opportunities cannot last for very long periods of time in a stock, but the very existence of arbitrageurs implies that there are opportunities in the markets for sometime.

Interest Rate Futures

In the currency futures the underlying assets for the futures contract will be different currencies, and in case of interest rate futures the underlying assets will be different interest bearing instruments like T-bills, T-notes, T-bonds, deposits, etc.

Interest rate futures can be defined as follows:

"An interest rate futures contract is an agreement to buy or sell a standard quantity of specific interest bearing instruments, at a predetermined future date and at a price agreed upon between the parties".

It is a known fact that money lenders stand to lose if the interest rates go down in future and the money borrowers stand to lose if the interest rates go up in future. The uncertainty in interest rate fluctuation has led to the innovation of techniques to hedge such risks. Interest rates futures are one such method of doing the same.

The main factors behind the growth rate of interest rate futures are as follows:

- Enormous growth of the market for fixed income securities.
- Increased fluctuation in interest rates worldwide.

Interest rate futures can be based upon both short-term (less than one year) and long-term (more than one year) debt obligation. But in the US only short-term interest rate futures like futures on US 90-day treasury bills and 3 months Eurodollar time deposits are popular. In the case of long-term interest rate futures, the most important contracts are the treasury bond futures contract, the 10-year treasury note futures contract and municipal bond futures contract. In the US, the long-term and intermediate-term futures are traded on the Chicago Board of Trade (CBOT) whereas short-term contracts are traded on the International Monetary Market (IMM) of the Chicago Mercantile Exchange (CME). There are contracts on 5-year notes which are traded on the CBOT and the Financial Instrument Exchange (FINEX). There are also some dollar denominated interest rate futures that are traded in London International Financial Futures Exchange (LIFFEX) and The Singapore International Monetary Exchange (SIMEX). There can be automatic offset of a contract by trading simultaneously in two different markets. For example, one can buy in Chicago in the morning and sell the identical contract in Singapore at night.

OPTIONS

Options on commodities have existed in different forms since 1860 for products as diverse as gold, wheat and tulip bulbs in the US. An active Over-the-Counter market in stock options has also existed for nearly a century. However, large-scale manipulations by intermediaries and the absence of standardized contracts resulted in the investors incurring heavy losses due to which the commodity options disappeared from the listing of many exchanges by 1968. It was only in 1973 that organized exchanges began trading options on equities. In 1982, futures on equity and options on bonds made their appearance on stock exchanges.

An option in a financial market is created through a financial contract. This financial contract gives a right to its holder to enter into a trade at or before a future specified date. The underlying assets on options include stocks, stock indices, foreign currencies and debt instruments, commodities and futures contracts. These are called stock options, index options, commodity options, currency options and futures options. An option is different from other derivatives in that it provides a downside protection against risk and also an upside benefit from favorable movements in the underlying asset prices.

Meaning of Option

An Option is a contract in which the seller of the contract grants the buyer, the right to purchase from the seller a designated instrument or an asset at a specified price which is agreed upon at the time of entering into the contract. It is important to note that the option buyer has the right but not an obligation to buy or sell. But, if the buyer decides to exercise his right the seller of the option has an obligation to deliver or take delivery of the underlying asset at the price agreed upon. The seller of the option is also called the writer of the option.

Currency Options

The largest portion of the currency option market is the interbank market. Some of the stock exchanges list currency options also. For instance, the Philadelphia Stock Exchange lists options on foreign currency. A currency call is similar to a call on a stock that gives the holder the right to buy a fixed amount of foreign currency at a fixed exchange rate on or before the option's expiration date.

A currency put gives the holder the right to sell a fixed amount of foreign currency at a fixed exchange rate on or before the option's expiration date.

Futures	Options	
Exchange traded, with novation	Same as futures.	
Exchange defines the product	Same as futures.	
Price is zero, strike price moves	Strike price is fixed, price moves.	
Price is zero	Price is always positive.	
Linear pay-off	Non-linear pay-off.	
Both long and short at risk	Only short at risk.	

Some of the differences between futures and options are:

Caps, Floors and Collars

Caps and floors are special types of borrowing and lending options, which are meant for long-term hedging.

Caps (Interest Rate Caps)

A Cap is a series of interest rate options, which guarantees a fixed rate payable on a borrowing over a specific time period at specific future dates. If interest rates rise above the agreed cap rate then the seller pays the difference between the cap rate and the interest rate to the purchaser. A cap is usually bought to hedge against a rise in interest rates and yet is not a part of the loan agreement and may be bought from a completely different bank/writer. In a cap, usually an upfront fee is to be paid to the bank/writer. The cap guarantees that the rate charged on a loan at any given time will never exceed the current existing rates or the cap rate. The cap working is depicted in the following graph:



Floors (Interesst Rate Floors)

A Floor is an agreement where the seller agrees to compensate the buyer if interest rates fall below the agreed upon floor rate. It is similar to a cap, but ensures that if the interest rate falls below a certain agreed floor limit, the floor limit interest rate will be paid.



Collars

A Collar is a combination of a cap and a floor where you sell a floor at a lower strike rate and buy a cap at a higher strike rate. Thus, they provide protection against a rise in interest rates and some benefit from a fall in interest rates. The pay-off profile of a cap and a collar are given below.


FINANCIAL SWAPS

The term 'swap' has two different meanings in the financial markets. In one definition, it refers to the simultaneous purchase and sale of currency for different maturities or vice versa. The other definition states that it is the agreed exchange of future cash flows with or without any exchange of cash flows at present. The base on which the cash flows are exchanged may be different and it gives rise to different types of swaps.

Financial swaps are broadly classified into:

- Interest rate swaps,
- Currency swaps.

Swaps have been defined variously as:

- A transaction in which two parties agree to exchange a predetermined series of payments over time;
- An agreement between two parties to exchange interest payment for specific maturity on an agreed upon notional amount;
- An arrangement whereby one party exchanges one set of interest payments for another, example fixed for floating rate;
- An agreement between two parties to exchange a series of payments, the terms of which are predetermined can be regarded as a financial swap.
- Swaps can be divided into short-term, medium-term and long-term swaps. While short-term swaps have maturity periods of less than three years, medium-term swaps mature between three and five years and long-term swaps have a life extending beyond five years.

Interest Rate Swaps

Definition

Many different types of swaps have evolved over time. The most common among them are the interest rate swaps, currency swaps and the cross currency interest rate swaps.

An interest rate swap is defined as an agreement between two or more parties who agree to exchange interest payments over a specific time period on agreed terms. The interest rates agreed may be fixed or floating. If there is an exchange of interest obligations then it is termed a liability swap. If there is an exchange of interest income then it is an asset swap.

The simple interest rate swaps are popularly called plain vanilla swaps. There are many variants on the plain vanilla swaps. These swap variants are the major innovations in the swap market and are tailored to suit different needs of different customers.

The basic swap techniques can be explained using the plain vanilla swap concept. In plain vanilla swaps fixed rate obligations are exchanged for floating rate obligations over a specific period of time on a notional principal. They are also called coupon swaps or generic swaps.

Parties: A Swap Transaction

There are two parties to a swap transaction – a fixed rate payer/receiver and floating rate receiver/payer. A fixed rate payer is the provider of floating rate funds and hence the purchasers of the swap lose when interest rate falls and gain when interest rate rises. A floating rate payer is the provider of fixed rate funds and hence the seller of the swap loses when the interest rate rises and gains when it falls.

SWAP MARKET TERMINOLOGIES

Trade Date: It is the date on which swap is entered into. This is the date when both the parties have agreed for a swap.

Effective Date: Effective date is the date when the initial fixed and floating payments begin. Effective date is also called value date. If the effective date is after two days of the trade date, then it is called spot date. The maturity of a swap contract is computed from the effective date.

Reset Date: The applicable LIBOR for each period is to be determined before the date of payment. It is usually determined before the commencement of the applicable period. Generally for the first payment, the LIBOR rate applicable will be set at the trade date if the value date falls two days after the trade date. The first reset date will generally be 2 days before the 1st payment date, the second reset date will be 2 days before the 2nd payment date and so on.

Maturity Date: The date on which the interest accrual stops.

Assignment Broker: Market maker in swaps.

Let us consider two illustrative examples: Two parties X and Y are interested in raising funds; Firm Y can raise funds in fixed and floating markets at 10% and LIBOR + 0.25% respectively. Firm X can raise funds in fixed and floating markets at 10.75% and LIBOR + 0.50% respectively. These rates are applicable to a \$100m borrowing for 2 years. While X and Y can borrow both in fixed and floating markets, firm X is interested in borrowing at the fixed interest rate while firm Y is interested in borrowing rates.

Table 6

Firm	Objective	Fixed interest	Floating interest rate
Х	Fixed Rate	10.75%	LIBOR + 0.50%
Y	Floating Rate	10.00%	LIBOR + 0.25%

In the table 6, we can see that the cost of borrowing for Y is lower than that of X in both the markets. This difference is called quality spread, which can be quantified for both fixed and floating rate markets as below.

•	Fixed market:	10.75% - 10.00% = 0.75%
•	Floating market:	LIBOR + 0.50% - LIBOR 0.25% = 0.25%

The advantage enjoyed by Y is known as absolute advantage, hence we say that Y has an absolute advantage in fixed rate and floating rate markets. However, it can be observed that the cost of funds for X is higher in fixed rate market by 75bp whereas the same is higher by 25bp in the floating rate market. It means that X has a relative advantage in the floating rate market. This advantage is known as the comparative advantage. Hence we can say that X has comparative advantage in the floating rate market. Boy advantage in the floating rate market. However, considering the comparative advantage enjoyed by X it is possible to reduce the cost of funds for both X and Y if they borrow in the markets where they enjoy comparative advantage and then swap the borrowing. The reduction in the cost depends on the quality spread.

In this case the amount of benefit that can be derived by both the parties will be the difference between the quality spreads which is 50bp (i.e. 0.75% - 0.25%). Assume that both the firms want to share the benefit equally between them.

Under the swap arrangement:

- Y borrows funds in fixed rate market and lends to X.
- X borrows funds in floating rate market and lends to Y.

Let us assume that X lends to Y at LIBOR and Y lends to X at 10%.





As seen from the above table funds are available to Y at LIBOR as against LIBOR + 0.25 and X at 10.50 instead of 10.75%. Thus, swap enables reduction in cost of funds.

Interest Rate Swaps with an Intermediary

The above is an illustration of a swap involving only two parties. These two counterparts are end users of the swap. As indicated above, swap requires that two parties with equal and opposite needs must come in contact. This requirement of 'double coincidence of wants' which is more an exception than a rule, has created a role for intermediaries. An intermediary is often needed to bring together the counterparties in a swap agreement. In that case, part of the total benefit has to be shared with the swap intermediary. The total benefit from the above swap is 0.05%. If the intermediary charges a fee of say 0.01% and the net benefit of the swap is shared equally, each party will be able to lower its cost of funds by 0.02%. Banks, by virtue of their special position in the financial markets and knowledge of the diverse needs of clientele, are in a good position to fulfill this role. Initially, intermediaries arranged swaps for earning brokerage, fees, etc. But these days, due to high liquidity, intermediaries themselves are taking positions. Having taken a position, they subsequently enter into swap with another party as and when a client is available, so that they do not run the interest rate risk. This results in squaring off their positions. If they are unable to balance their swap books, they can hedge interest rate risk by using other derivatives like interest rate futures, forward rate agreements, etc.

Conventions Followed

The following are the generally followed conventions in swap instruments:

Fixed	Floating
30/360	Actual/360
Actual/Actual	Actual/Actual
Actual/360	Actual/365
Actual/365	30/360

Table	8
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ACTUAL/360

In this convention the actual number of days are counted between the previous fixed day payment date and forthcoming fixed day payment date, including the previous fixed date and excluding the forthcoming fixed day.

Example: If the previous fixed day payment date and forthcoming fixed day payment date are:

04-09-20x1 and 04-03-20x2, then the fixed day count fraction will be 181/360.

ACTUAL/ACTUAL

In this convention the numerator will be calculated according to the method of actual/360, but the denominator changes depending on whether the forthcoming payment date is in a leap year. If the forthcoming year is a leap year then the days will be counted on a *pro rata* basis.

Example: If the previous fixed day payment date and forthcoming fixed day payment date are:

04-09-20x1 and 04-03-20x2, then the fixed day count fraction will be calculated as (119/365) + (63/366).

ACTUAL/365

This convention is similar to that of actual/360, except that the denominator will be taken as 365.

30/360

In this convention each month will be taken as 30 days, including the previous fixed date and excluding the forthcoming fixed date.

Example: If the previous fixed day payment date and the forthcoming fixed day payment date are:

04-09-20x1 and 04-03-20x2 then fixed day count fraction will be $(27 + 30 \times 5 + 3)$ i.e. 180/360.

There are certain exceptions to this rule: If the forthcoming fixed date is 1st of any month and the previous month does not have 30 days then actual days in that month will be taken to calculate the fixed day count fraction.

Example: If the previous fixed day payment date and forthcoming fixed day payment date are:

01-09-20x1 and 01-03-20x2 then fixed day count fraction will be $(30 \times 5 + 28)$ i.e., 178/360.

Example: If the previous fixed day payment date and forthcoming fixed day payment date are:

01-08-20x1 and 01-02-20x2 then the fixed day count fraction will be $(30 \times 5 + 31)$ i.e., 181/360.

Other Types of Interest Rate Swaps BASIS SWAP

A swap in which a stream of floating interest rates are exchanged for another stream of floating interest rates, is known as basis swap. Such type of swap is possible when,

Both the floating interest rate streams are based on the same structure, but different instruments,

Example: A promises to pay B and B promises to pay A 3 months LIBOR to 3 months Treasury Bill yield.

Note: Aspects need to be checked while paying interest;

Interest base : Money market (actual/360 or 365); or

Bond (30 days month and 360 days year)

Periodicity : Annually, Semi-annually, Quarterly.

The two interest rate streams are calculated using the same index, but different tenors.

Example: 'A' pays 3 months LIBOR and 'B' pays 6 months LIBOR.

The two interest rate streams are calculated using the same index and the same tenor, but with one of the rates having a margin. Example 'A' pays 3 months LIBOR + 1% and 'B' pays 3 months LIBOR.

FORWARD SWAPS

In forward swaps the commencement date is set at a future date. Thus, it helps in locking the swap rates and uses them later as and when needed. Forward swaps are also known as deferred swaps (different from deferred rate swaps) as the start date of the swap is delayed (deferred). This is attractive to those users who do not need funds immediately but would like to benefit from the existing rates of interest.

Suppose a firm is contemplating to invest in a project 2 years hence, and the initial outlay required will be \$20 million when the project begins. The firm is not sure of the movement of the interest rates in the next 2 years. The loan will be taken for a 5-year term. It would like to protect itself against interest rate risk and would want to enter into a fixed-floating rate swap. It can then enter into a forward swap agreement with another firm now on which the payments will start 2 years hence.

DEFERRED RATE SWAPS

It is different from a forward rate swap in that it allows the fixed rate payer to enter into a swap at any time up to a specified future date. Thus, it works to the convenience of the fixed rate payer that the payment can be deferred until a time when the rates are lower so that he ends up paying less than what would have been paid, if paid at the rate on the commencement date. It is particularly attractive to those users of funds that need them immediately but do not consider the current rates of interest very attractive and feel that the rates may fall in future.

CALLABLE SWAPS

A callable swap gives the holder, i.e. the fixed rate payer, the right to terminate the swap at any time before its maturity. Should the interest rates fall, the fixed rate payer exercises his right and terminates the swap since the funds will be available at a lower rate now. This right has a fee in terms of a higher fixed rate at the commencement of the agreement than what would be normally charged and calculated as a percentage of the swap's notional principal.

PUTABLE SWAPS

A putable swap lets the seller of the swap (the floating rate payer) terminate the swap at any time before its maturity. If the interest rates rise, the floating rate payer will terminate the swap. The option premium in this case will be a higher floating rate charged at the beginning of the swap. Sometimes, a termination fee is also charged which is calculated as a percentage of the swap's notional principal.

EXTENDIBLE SWAPS

In an extendible swap, the fixed rate payer gets the right to extend the swap maturity date. If the interest rates rise and are expected to rise further then such an extendible swap works to the advantage of the fixed rate payer since he is required to pay less than the current rates. The premium charged for this right will be a fixed rate higher than the prevailing rates at the beginning of the agreement. In some cases, an extension fee is also charged. Assume that during the tenor of an interest rate swap, one party to the swap wishes to extend it by two more years and if the proposal is accepted by the counterparty then the swap becomes an extension swap.

RATE CAPPED SWAPS

An interest rate swap which incorporates the cap feature is called a rate capped swap. If a floating rate payer anticipates a rise in interest rates then he can purchase a cap at a fee payable upfront to the fixed rate payer so that the floating rate payable cannot exceed the capped rate. This gives more protection to the floating rate payer. An upfront fee is payable by him to the fixed rate payer.

Another type of rate capped swap is the mini-max swap which has both a floor and a ceiling rate to the floating rate.

ZERO COUPON SWAPS

In a zero coupon swap the fixed rate payer makes a single fixed payment at the maturity of the swap from the proceeds of the bond repayment. It is a variation of the plain vanilla swap. The interest is calculated on a discount basis, while the floating rate payer makes periodic payments.

AMORTIZING SWAPS

If the interest rates are fairly stable then the floating payments are also reduced over time. This swap is particularly useful if a swap is undertaken to manage the risk arising from mortgage loans. Since the principal on a mortgage loan is amortized over the life of the loan, an amortizing swap is particularly useful to manage the associated interest rate risk.

AMORTIZED SWAPS

In these swaps, the notional principal amount on which interest is paid decreases according to a predetermined schedule mostly based on a sinking fund. With a plain vanilla, the amount remains the same. A plain vanilla swap is suitable where loan interest is payable periodically, but the principle being borrowed is repaid in one lump sum at the end of the period. It is a bullet repayment and the plain vanilla is sometimes called a bullet swap for this reason.

Main customers for this type of swap are:

- Customers of banks who wish to match repayment schedule on loans as precisely as possible.
- Customers of banks who wish to manage the interest rate risk involved in predicated funding requirement, or investment programs.

ACCRETING SWAPS

Assume that there is an infrastructure project with a high capital outlay. Normally, loans on such projects will be given in installments and the interest payments are made on the increasing loan amounts. Typically, the loan is committed at the outset and the additional loans will be made available at a market rate (which will be changing every time). These floating rate payments can be converted into fixed rate payments through an accreting swap where the principal amount increases every time additional loan is availed. It is same as amortized swap, except that the notional principal amount increases according to predetermined schedule.

ROLLER-COASTER SWAPS

In an interest rate swap deal, interest rate risks can be shifted by converting a floating rate liability to a fixed rate liability, or vice versa. IRS can take different forms as they can be structured to meet each corporate's specific requirements. Ideally, to minimize the interest rate risk over the life-span of loan, a corporate should move from a floating to a fixed rate term at the bottom of an interest rate cycle, and do the opposite at its crest. It is a combined feature of both amortized swap and accreting swap, i.e. the notional principal increases and decreases during the life of the transaction, going up and down according to a schedule agreed at the time of the deal.

Underlying Motives for Swap Transactions

The basic questions, which nag everyone, are why someone should enter into a swap contract? Why companies want to change their cash flows from fixed to floating or from floating to fixed? While there can be many reasons for undertaking a swap transaction, the following are some of the significant motives:

- Quality spreads (lower financing costs)
- Currency risk management
- Interest risk management.
- Real time trading on the swap market.
- In addition, swaps may be used to:
- Enter new markets
- Larger scale of operations.

QUALITY SPREADS (LOWER FINANCING COSTS)

One of the important reasons for entering into a swap transaction is to reduce the interest cost. The reduction in the interest cost can be achieved because of the quality spreads prevailing in the market. Quality spread is the difference between borrowing power of two parties in the market. For example, Firm X can borrow at a fixed rate of 10%, while Firm Y can borrow at a fixed rate of 12%. This difference between the interest rates of X and Y is called the quality spread. This difference in the interest rates arises because of the difference in the credit ratings of the two firms. In the above case firm X could have been rated better by the market in comparison to firm Y. Firms X and Y face interest rates of LIBOR + 1 and LIBOR in the floating rate market.

The following table summarizes the rates faced by both the firms.

Firm	Fixed Rate	Floating Rate	
Х	10	LIBOR + 1	
Y	12	LIBOR	

As seen from the above, firm X has absolute advantage in the fixed rate market whereas firm Y has absolute advantage in the floating rate market. Considering that both have absolute advantage in different markets it can be beneficial if both of them borrow in the markets where they have advantage and swap the borrowings if the same is in line with their objectives of borrowing. In such a situation, the benefit that can be derived by the swap will be the sum of the quality spreads in both the markets. Thus in this case the quality spread in the fixed rate market is 2% whereas the same in case of floating rate market is 1% and hence the benefit that can be derived from the swap will be 3%. We have already seen earlier that a swap can bring benefits to both the parties even when a single party has absolute advantage in both the markets. The essential difference to be noted is that the benefit that can be derived from the swap in that case is the difference between the quality spreads. While the mechanics are clear it still needs to be understood why such quality spreads exist in the market.

Credit Rating: As stated earlier the firm with a higher credit rating attracts a lower rate of interest. However, when the firm faces a floating rate market the risk premium demanded will be low relative to the fixed rate market since the interest rate in case of floating rate market moves in line with the market. Hence the spread in floating rate market and fixed rate market are likely to differ.

Market Saturation: Market saturation is one of the important reasons, which results in differential spreads to prevail. For example, IDBI and ICICI raised money through debt issues in the domestic market in the recent past. If this continues, the market is likely to reach a stage where the acceptability of the paper may be low not necessarily because the quality of the paper is low, but because the market has seen too much of the same paper. This can result in the market demanding a return higher than what would otherwise be considered as normal. In such a situation they can raise the funds abroad and swap them for the domestic currency. By this mechanism the firm can achieve the objective of borrowing funds in the domestic market.

Financial Norms: The financial leverage of a firm adds to the financial risk thereby influencing the risk premium demanded. However, what is considered as an acceptable level of leverage varies from market-to-market. It is often said that high leverage is an acceptable proposition in the Japanese markets though it might have undergone some change after the real estate bubble. In such a situation, a firm with a particular level of leverage may be able to get a better rate in overseas market when compared to the domestic market thus resulting in the prevalence of quality spreads.

CURRENCY RISK MANAGEMENT

Management of the currency risk is vital for modern corporates as they have cash inflows and outflows in different currencies. A corporate can use different methods to manage its currency risk. One of the methods for corporates to manage the currency risk is by entering into currency swaps.

Example: A firm whose exports are denominated in GBP has borrowed funds in dollars in view of the low interest rates in the Euro dollar market. However, since its cash inflows are in GBP, the firm is exposed to exchange risk. At this point, the firm can change its loan portfolio into GBP by entering into a currency swap so that both receivables and payables are in the same currency.

INTEREST RATE RISK

Corporates manage the interest rate risks by entering into interest rate swaps. If a corporate borrows in floating rate and expects that interest rates will increase, then it can enter into an interest rate swap as a fixed rate payer. Due to this it will be able to manage the increase in interest rates more efficiently.

Example: Firm X borrows floating rate funds at LIBOR + 1%. After sometime if the firm feels that the interest rate may increase it may prefer borrowing in fixed rate. The firm can achieve this by undertaking either of the following activities:

- Repay the existing loan and borrow at fixed rate.
- Enter into an interest rate swap.

The first choice will be more cumbersome because the firm has to go to the market again to borrow at a fixed rate, which may not be cost effective. In the second choice, the firm has more flexibility in managing its existing interest rate risk. Besides, no significant costs will be involved in entering into the swap.

REAL TIME TRADING ON THE SWAP MARKET

In all the above illustrations, we have structured the swap to suit the needs of the client and the basic assumption we have made is that all the swap transactions taken by the bank will be matched with another party. All the above illustrations are, of course, very simplistic, but in real time there can be many more complicated structures in swaps due to the following reasons:

- More than one bank may be involved.
- The swaps and the borrowing in cash market may take place at different times.
- A bank may run unmatched position, either by choice or because of its difficulty in finding a counterparty.
- Objectives may be more complicated.

Due to the above reasons and owing to the fast growth in interest rate derivative products, banks themselves started giving both bid and ask rates for the swap contracts.

Enter New Markets

Many companies can enter new markets, mainly in other countries, by resorting to swapping to reduce currency risks, as explained in currency risk management above.

Larger Scale of Operations

With swaps a firm may be able to reduce the risks and the volatility of the profits. Thus, for a given amount of capital, more business transactions may be made with the assurance of lower risks. For example, let us assume that XYZ Ltd. must hold $\pounds 1$ of capital to earn $\pounds 0.1$ (10 pence) of profit and the volatility of its profits is $\pounds 0.01$ (1 penny). Without swapping, the company will only try to do $\pounds 10$ worth of trades for every $\pounds 1$ of capital, fearing that the volatility may affect its profits otherwise.

Now, say that by swapping, its risk volatility reduces to 5% of the current ± 0.01 . It means that XYZ Ltd. can increase its trades to $\pm 10 \times 20$ times = ± 200 of trade for every ± 1 of capital held.

CREDIT DERIVATES

Credit derivatives are the financial instruments designed to transfer the credit risk of one counterpart to another. Credit risk arises mainly due to the default of the debtor or due to the deterioration of the credit quality of the debtor. During the incidence of such risk the creditor receives only that amount which can be recovered from the debtor. Therefore, it becomes essential for the investors to assess and mitigate credit risk through efficient hedging strategies. Credit derivatives are the outcome of such efforts intended to dilute the effects of credit risk.

Types of Credit Derivatives

Credit derivatives can be broadly categorized into four types. They are:

DEFAULT SWAPS

Also called Credit Default Swaps (CDS), these instruments involve taking a position by parties to the contract on the credit quality of the reference obligation. The buyer of the instrument will be at advantage if the credit quality of the reference obligation decreases. This will increase the premium on the credit default swap and the buyer can sell the swap at an increased market premium. On the other hand, the seller of the default swap can be benefited from a situation wherein the credit quality of the reference obligation increases resulting in a decrease in the present value of the swap.

The seller can make a profit on the instrument by buying it back at market premium. Thus, default swaps can be of great use in hedging the risk exposures in credit transactions, increasing gains by assuming credit risk on reference obligation and in exploiting other arbitrage opportunities. Various types of default swaps include Binary or Digital Default Swaps, Basket Credit Default Swaps, Cancelable Default Swaps, Contingent Default Swaps, Leveraged Default Swaps and Tranched Portfolio Default Swaps.

Default swaps help reduce the default risk in an economy and also the price deterioration of the reference obligation. This will in turn help in preserving a good bank-client relationship and help an individual reduce his regulatory capital.

TOTAL RATE OF RETURN SWAPS

Total Rate of Return Swaps represents the nonfunded position in a reference obligation. The benefit derived by the receiver of the instrument is directly proportional to the price of the reference obligation. Similarly, the benefit to the buyer is inversely proportional to the price of the reference obligation. Like that of default swap TROR helps in reducing economic risk as a whole. Coming to an individual point of view TROR will be beneficial in terms of providing a hedge mechanism against default risk, credit deterioration risk and market risk.

CREDIT-SPREAD PRODUCTS

Credit-Spread refers to the difference between the yield of a risky bond and the yield of a risk-free bond. Credit-Spread Products are another kind of credit derivatives used in hedging various credit related risks. The most commonly used credit-spread products are credit-spread options, credit-spread forwards and credit spread swaps. Credit-spread options will be beneficial to investors when they are uncertain about the possible decrease in the underlying asset. In case, the investors are sure about the possible decrease in the underlying asset then it will be advantageous for them to opt for either credit-spread forwards or credit-spread swaps. Similar to other credit derivative products, creditspread products provide multiple benefits to the investors like arbitrage, cost reduction, regulatory capital reduction, etc.

SYNTHETIC STRUCTURES

Since their launch in the year 1997, synthetic structures evidenced tremendous growth.

Instruments that are most commonly found in this segment include:

- **Credit-Linked Notes (CLNs):** Credit-Linked notes refer to an underlying obligation with an embedded credit feature. The coupon rate is dependent on the credit quality of the reference obligation. While the motivational factor for CLN issuer is the transfer of default as well as deterioration risks, the motivational factor for CLN buyer is yield enhancement. CLNs are useful to those investors who are unable to trade in derivatives securities due to regulatory or other impediments.
- Collateralized Debt Obligations (CDOs): Collateralized Debt Obligations are different from creditlinked notes in the sense that these instruments are arranged by a Special Purpose Vehicle (SPV) of financial institutions usually containing triple-A rating. Moreover, CDOs can provide credit exposure to a basket of 200 or more credits and provide specific risk profiles to investors. CDOs are beneficial to the owners of the assets who can lay-off credit without the notice of the investors and maintain good relationship with investors. From the investors point of view CDOs can be differentiated in terms of SPVs motivation. CDOs are termed as arbitrage CDOs in the event of SPVs making profit as a difference between incomes generated from tranches and default swap premiums and coupons of risk-free assets.

On the other hand, if the SPVs motive is to reduce regulatory capital then the CDOs used in such circumstances are called balance sheet CDOs. The difference in CDOs can be made in terms of SPVs repayment to investors. If the liability repayments are made through successive selling of assets related to tranched portfolio then such a CDO is called market value CDO. In case, the repayments are made through coupon flows and notional amount repayments then the CDOs are called as cash flow CDOs. The latest variations in CDOs can be found in instruments like Tranched Portfolio Default Swaps, Tranched Basket Default Swaps and CDO Squared Structures. Tranched Portfolio Default Swaps(TPDS) are different from that of Tranched Basket Default Swaps(TBDS) in a sense that in TPDS default exposure is linked to a certain amount of loss and in TBDS it is linked to a certain number of defaults.

CDO squared structures are the most advanced form of CDOs that generate higher returns at the expense of increased complexity and risk. Being a novel concept in the credit derivatives arena synthetic structures are continuously monitored and rated by different rating agencies to make the investor better informed about the quality of these instruments. The credit rating of synthetic structures can be found and analyzed using coverage ratios. The most famous instruments in this segment include JP Morgan's own Clip structure, Deutsche Bank's J-Port and Repon, and UBS's Alpine structure.

Application

Credit derivatives are useful in several ways to the people and institutions associated with these contracts. The major applications of credit derivatives can be categorized into five types. They are:

i. **Hedging:** Credit derivatives can help in mitigating various types of risks like market risk, credit risk and operational risk. During 1990s, credit markets evolved as new actively traded environment in the financial markets regime. The emergence of credit derivatives provided a much awaited relief for the investors to hedge against various risks encompassing these financial markets. The most commonly found risk categories associated with interest rate, currency, equity and commodity markets are liquidity risk and volatility risk. Futures, swaps and options are selectively used in these environments to mitigate these risks and enhance credit quality.

- ii. Yield Enhancement: Yield enhancement is another important application of credit derivatives. Investment banks, Hedge funds and Individual investors are largely motivated by yield enhancement trait of credit derivatives. Many of the credit derivatives like CLNs and CDOs provide the investors with above- the-market yield. The major strategies adopted usng these instruments include covered credit-spread put selling strategy, covered credit-spread call selling strategy, shorting a digital credit straddle strategy, credit-spread forward strategy, selling a credit-spread straddle strategy, etc. Most of these strategies feature a higher downside risk and this requires the investors to be cautious about potential losses.
- iii. Cost Reduction and Convenience: Credit derivatives provide investors with cost reduction advantages along with a highly convenient mode of trading. Cost reduction will be advantageous in an environment where the cash market is liquid and makes trading in credit instruments expensive. In such an environment, institutions with poor credit ratings can be benefited by limiting their funding requirements. It is considered to be cheaper and convenient either to short or swap credit derivatives. Further, credit derivatives can also help in maintaining good bank-customer relationship.
- iv. **Arbitrage:** The replication feature inherent in credit derivatives makes them provide arbitrage opportunities to the investors. Credit derivatives can be replicated with many other financial instruments. Taking the return factors and market risk into consideration investors can go short or long on specific instruments without incurring any additional costs.
- v. Regulatory Capital Relief: The new Basel Accord focuses on assessing risk exposures for sovereigns, banks and corporations based on internal and external ratings. Significance is given to internal ratings approach in particular as it allows banks to assess their risk components based on customized approaches. Pillar-1 of the Basel Accord introduced new minimum capital requirements for banks with regard to market, credit and operational risks. As per the Basel Accord requirements, trading book of financial institutions requires lower capital charges. In this context, credit derivatives can be posted by the financial institutions in trading book. Moreover the Basel Accord has granted a capital relief of 100% for TRORs and 80% for default swaps is granted in the event of an exact match between maturity and notional amount.

Pricing of Credit Derivatives

The complexity in monitoring the market price of an underlying credit obligation often makes the pricing of credit derivatives a difficult task. Together with this understanding the creditworthiness of a debtor is often a cumbersome task as it is not easily quantifiable. Moreover, the incidence of default is not a frequent phenomenon and makes it difficult for the investors to find the empirical data of a solvent company with respect to default. Though, one can take the help of different ratings published by ranking agencies, often these ratings will be different and will create chaos among investors.

For effectively pricing derivatives, various factors should be taken into consideration such as default probability of the reference obligation, default probability of the counterparty and the correlation between the defaults of reference assets and the counterparty. Pricing methods for credit derivatives can be broadly categorized into two segments:

- a. Traditional models or Structural models,
- b. Reduced form models.

Structural models are closely related to the Merton model, 1974. These models are divided into firm value models and first time passage models. The firm value models postulate that if the asset value of the company goes below its debt value at the maturity time of the debt then such company is considered to be bankrupt. According to first-time passage models bankruptcy occurs when the asset value drops below a prefixed limit even before the maturity of debt.

Reduced form models do not take into consideration the asset-liability structure of the company for analyzing defaults. Rather they derive their factor inputs from explicit economic reasons. The key ingredients of these models are debt prices. Under these models default is modeled through a stochastic process which involves multiplication of an exogenous default intensity or hazard rate with certain time frame. The output of this process will be the risk-neutral default probability.

All these models are widely used in pricing credit derivatives instruments. Efforts are in progress to develop a coherent combination of structural and reduced form models that can bring more transparency and accuracy into this field.

OTHER TYPES OF CURRENCY SWAPS

Fixed to Floating Currency Swaps (Non-amortizing)

As in a currency swap, the parties exchange the principal at the outset but one party pays a fixed rate of interest on the foreign currency it receives and the other party pays a floating rate of interest rate on the foreign currency it receives. It is a plain vanilla currency swap. At the swap's maturity, there is a re-exchange of principal amounts. Interest payments are periodically exchanged during the life of the transaction.

Fixed to Fixed Currency Swaps (Non-amortizing)

It is identical to the fixed to floating currency swap except that instead of a fixed and a floating rate of interest, both parties pay fixed rate of interest. This can be done by having a single agreement or two agreements for swapping.

Circus Swaps

Here two fixed-floating currency swaps are combined to form a fixed to fixed currency swap which is also called a circus swap. It can be created by combining a currency swap and an interest rate swap too, with floating rate or both having LIBOR based pricing.

PRICING OF SWAPS

Basics

Since swap is an exchange of two streams of cash flows it can be priced by determining the value of each stream of cash flows. The value of each stream of cash flows is the net present value of the cash flows in the stream. If the cash flows are in different currencies (as in currency swaps) the present values are converted into a single currency at the prevailing exchange rate. The price of the swap is the difference between the values of the two cash flows.

Pricing of Swaps by Swap Banks

Swap banks price each swap based on the following six factors:

- How the swap has been designed?
- How long the swap will take till maturity?
- How many parties match the swap?
- How creditworthy are the counterparties to the swap?
- How the swap is affected by regulatory implications of the countries to which both counterparties belong?
- How tight is the credit policy in the countries from where the swap counterparties hail?

SWAP RISKS

While the earnings of the swap bank are from the bid-ask spread of swaps and the fees charged (upfront fees), it has to entail the following risks, which are inherent to the swap business and are mostly interrelated:

Interest Rate Risks

Interest rate risks arise mostly on fixed rate legs of swaps. While the floating rate interest can be periodically adjusted to the prevailing interest rates, the fixed rate remains constant. A change in the level of interest rates in the market not accompanied by a change in the yield of debt instruments of the same time period as the interest rates, will entail interest rate losses to the bank. Unless the swap bank is fully hedged, losses will be incurred.

Currency Exchange Risks

Currency exchange risks occur when there is an exchange rate commitment given to one party and there is a steep change in the exchange rate between the currencies in the swap. If the swap bank is not able to match the counterparty well in time, it will incur losses due to the exchange rate difference.

Market Risks

Market risks occur when there is difficulty in finding a counterparty to a swap. Usually, longer maturity swaps have less takers and vice versa. Lower the number of takers, higher the risks of losses.

Credit Risks

Credit risks are those risks which the swap bank has to bear in case the counterparty to a swap defaults on payment due to bankruptcy or any other default, legal or otherwise. The bank continues to be obliged to pay the other party of the swap, irrespective of whether the former party defaulted or not. Market risks and credit risks together amount to default risks of the bank.

Mismatch Risks

Mismatch risks take place when the swap bank comes across mismatches in the requirements of both counterparties to the swap. Usually, banks have a pool of swaps and have no difficulty in finding matches, but if no party is found, it leads to the risk of mismatch of losses. This risk is further aggravated in case one of the parties defaults.

Basis Risks

Basis risks take place mostly in floating-to-floating rate swaps, when both the sides are pegged to two different indices and both the indices are fluctuating and there is no proper correlation between both.

Spread Risks

Spread risks happen when the spread changes over the time period the parties are matched. The spread risk is not the same as interest rate risk, as spreads may change as a result of change in basis points, while the interest rate may still remain constant.

Settlement Risks

Settlement risks take place when the payments of currency swaps are made at different times of the day mainly because of different settlement hours in capital markets of two countries involved in the currency swap. If a limit on the size of the settlement is placed for each day, this risk is minimized.

Sovereign Risks

Sovereign risks are those risks that can take place if a country changes its rules regarding currency deals. It mostly happens in the underdeveloped or developing countries which tend to have more political instability than the developed world.

MANAGING SWAP RISKS

If a swap bank could exactly match all its portfolio of swaps, it would be an optimal situation, risk less and profitable, without the bank having to bother much about managing risks and maintaining a team of risk management experts on its payroll.

But as optimization is not always the case in real life situations, a bank has to minimize its risks as it cannot totally eliminate them.

To some extent, several risks are offset through natural hedging while the others must be measured and managed.

Some risks can be hedged through options, futures and other risk management tools.

Unsystematic risks (like credit risks) can be reduced by diversification and systematic risks (like sovereign risks) can be minimized by restricting or limiting one's entry in to new and unstable countries.

SUMMARY

- Futures contracts are the legally binding agreements to buy or sell a commodity sometime in the future, specifying the quantity, price and the date of delivery. Futures Commission Merchants act as brokers of prospective futures trading clients. The futures trading takes place in a physical place called an exchange.
- Price and Quantity risks are the two types of risks that can be foreseeable in the futures markets. The types of futures contracts being traded fall into four types of fundamental categories: Commodity Futures, Currency Futures, Interest Rate Futures and Index Futures.
- An interest rate futures, contract is an agreement to buy or sell a standard quantity of specific interest rate bearing instruments, at a predetermined future date and at a price agreed upon between the parties.
- An option is a contract in which the seller of the contract grants the buyer, the right to purchase from the seller a designated instrument or an asset at a specific price which is agreed upon at the time of entering the contract. If the writer gives the buyer of the option the right to purchase from him the underlying asset, it is called call option. If the writer gives the buyer of the option the right to sell the underlying asset it is called a put option.
- Swaps can be defined as a transaction in which two parties agree to exchange a predetermined series of payments overtime.
- Swaps originated as a result of the requirement of counterparties to obtain better terms of interest on currency. Swaps are seldom exchange traded and carry some residual risks to the intermediary. Although rare, default risk in unhedged positions do happen. Some swaps could be for very long periods, exceeding 10 years.
- An interest rate swap is an agreement between/among two or more parties who agree to exchange interest payments over a specific time period on agreed terms.

Appendix I

2000 BC	In India (forward trading by traders and agriculturists).		
400 BC	In ancient Greece and Rome (option trading in agriculture products).		
12th Century	European trade fair sellers (signs contracts promising future deliveries of trade items).		
17th Century (beginning)	Tulip Mania in Holland (1634-1637) (Trader's lost fortunes in a speculative boom in tulip futures burst).		
17th Century (late)	Dojima Rice Futures (Japan at Dojima (near Osaka) a futures market in rice developed to protect sellers from bad weather or warfare).		
19th Century	Asian Trader's Actively traded (In agriculture, products traded via sea) Chicago Board of Trade (1868). Trading in wheat, pork belly and copper futures starts.		
20th Century	Late 1960: Black and Scholes begin collaboration. Fischer Black and Myron Scholes tackle the problem of determining how much an option is worth. Robert Merton joins them in 1970. 1968: SCRA (Securities Contracts Regulation Act) bars use of Derivatives as a security in the formal set-up. Leads to derivative instruments moving to unorganized sector. April 1973: Chicago Board Options Exchange opens. May/June 1973: Black-Scholes Model published (<i>Journal of Political Economy</i> accepted the model after repeated rejections including once by JPE). 1994: Metallgesellshaft loses \$1.5 bn on oil futures. 1995: Baring Bank goes burst (Nick Leeson loses \$1.4 bn by speculating them in the Nikkei 225 index of leading Japanese company shares, which did not move from its normal trading range. The Kobe earthquake shattered that assumption on 17th January whereafter Leeson attempted to conceal his losses). 1997: Nobel Prize in Economics awarded to Robert Merton and Myron Scholes. Weather Derivatives Market and Instruments initiated (late 1997). Aquila Energy introduced a weather option embedded in a power contract. 1998: Long-Term credit management bailout (The hedge fund is rescued at a cost of \$3.5 bn to secure extensive losses to the world financial system). 1999: The Flaming Ferraris (some traders at CSFB sacked for illegal trades in an attempt to manipulate the Swedish stock market index).		
21st Century	 2000: India launches derivatives in formal setup (June 2000) in the Bombay Stock Exchange and National Stock Exchange. 2001: Enron goes bankrupt 7th largest company in US and the world's largest energy trader made extensive use of energy and credit derivatives, which built up an accumulated loss leading to bankruptcy. September 11 attack (terrorists made huge profits in Insurance and Airline's industry stocks). A model and a weather derivatives instrument based on water tables for hedging risks against floods, droughts and rainfalls developed by Aman Agarwal (for FSD Dept., The World Bank, USA), <i>Finance India</i>, XVI No. 3, September, 2002. 2002: AIB loses \$750 mn (John Rusnak uses fictitious option contracts to cover losses on the spot and forward foreign exchange contracts). 		

Table 1: Derivatives Time Line

Source: Agarwal Aman, Defining Parameters of an Underlying Variable (Asset/Value) and establishing Water Table as Underlying Value, Finance India, Vol. XVI No. 4 and Derivative Savings Instrument. The Empirical Economics Letters, September 2002.

Products	Index Futures	Index Options	Futures on Individual Securities	Options on Individual Securities
Underlying Instrument	S&P CNX Nifty	S&P CNX Nifty	40 securities stipulated by SEBI	40 securities stipulated by SEBI Type
Туре	-	European	SEDI	American
Trading Cycle	Maximum of 3-month trading cycle. At any point of time, there will be 3 contracts available: 1. near month, 2. mid-month and 3. far month duration.	Same as index futures	Same as index futures	Same as index futures
Expiry Day	Last Thursday of the expiry month	Same as index futures	Same as index futures	Same as index futures
Contract Size	Permitted lot size is 200 and multiples thereof	Same as index futures	Multiple of 100 subject to the minimum value of Rs.2,00,000	Multiple of 100 subject to the minimum value of Rs.2,00,000
Price Steps Base Price- First Day of Trading	Re.0.05 Previous day closing Nifty value	Re.0.05 Theoretical value of the options contract arrived at based on Black - Scholes model	Re.0.05 Previous day closing value of underlying security	Re.0.05 Same as Index options
Base Price- Subsequent	Daily settlement price	Daily close price	Daily settlement price	Daily closing price calculated as follows: If the contract is traded in the last half-hour, the closing price shall be the last half-hour weighted average price. If the contract is not traded in the last half- hour, but traded during any time of the day, the closing price will be the Last Traded Price (LTP) of the contract.
Price Bands	Operating ranges are kept at + 10%	Operating ranges are kept at 99% of the base price	Operating ranges are kept at + 20%	Operating ranges are kept at 99% of the base price
Quantity Freeze	20,000 units or greater	20,000 units or greater	Lower of 1% of market-wide position limit stipulated for open positions or Rs.5 cr.	Same as individual futures
Note BSE a	lso offers similar product	s in the derivative se	amant	

Table 2: Derivative Products on NSE

Note: BSE also offers similar products in the derivative segment.

Source: nseindia.com

<u>Chapter XI</u> Risk Management Strategies

After reading this chapter, you will be conversant with:

- Operational Risk Management Strategies
- Financial Risk Management Strategies
- Systemic Risk Management Strategies
- Risk Limitation
- IT Implementation Challenges

"We took risks, we knew we took them; things have come out against us, and therefore we have no cause for complaint."– Robert Falcon Scott 1868-1912: "The Last Message' in Scott's Last Expedition (1913).

Financial institutions and banks engage in different kinds of intermediation functions with respect to denomination, maturity, currency and default-risk. Performing these intermediation functions leads to undertaking various risks like interest rate risk, currency risk, liquidity risk and credit risk. In addition to these, financial institutions also bear market risk arising due to active trading of assets in financial markets.

The area of risk management has assumed special significance in light of the deregulation happening in the financial markets of emerging markets. Even in the comparatively liberalised economies like South-East Asian countries, the deregulation and reforms in financial sector have taken off very recently and there is a need for well thought out and debated ideas to carry out this process smoothly.

Banks and other financial institutions are compelled to adopt a comprehensive risk management practice, thanks to the ever increasing competition and regulatory pressures. Banking industry, in particular, has historically remained as a protected industry in many emerging economies. This is due to regulated deposit, lending rates and restriction on competition. Financial stability occupies center-stage as one of the prime policy concerns for the central banks worldwide at the time when banking operations have been undergoing rapid metamorphosis on global level. There is growing realization about the need for preservation of the safety and soundness of individual financial institutions, especially banks, and of the financial system as a whole. This is important not only for conducting business across national borders, but also for preserving financial stability, given the predominantly bank-based nature of financial systems in emerging markets. Not surprisingly, therefore, banking sector is passing through challenging times.

The industry was very complacent enjoying comfortable spreads. However, the following factors among others compelled banks to change the old ways of doing business:

- Technological advancements.
- Disintermediation pressures arising from a liberalized financial marketplace.
- Increased emphasis on shareholder value.
- Macroeconomic pressures and banking crisis during the 1990s.
- Globalization.

The dividing lines between financial products, types of financial institutions and their geographical location have become less relevant today than in the past. Greater globalization of banking operations in an increasingly market-driven environment has made risk management critical, while lending and deposittaking have continued to remain the mainstay of banking business. In this rapidly changing business environment, need for identifying the inherent risk an organization faces has become the fundamental principle. The present situation requires more sophisticated and comprehensive controls in order to bring the products more quickly into the market. This is the reason why the paradigm shift is directed from risk control to risk management. The process of risk management provides the company the basis to control their risks coupled with measurement of performance effectiveness. Another dimension is determination of capital allocation of and realization of business advantage, which brings about sustenance and growth of the banking and other financial companies on proactive lines.

Risk Management Strategies

In the past, organizations went bankrupt due to reasons that were microscopic such as competition, mismanagement or adverse conditions. It was during the nineties that many of the world's biggest banking companies started suffering losses. The reason was lack of proper risk management systems. But today anybody can individually deal in billions of dollars. So the task before the bank is to reduce the transaction and overall intermediation cost, improve yield of assets and slash both gross and net NPAs. This would be helpful in bringing about a structural transformation in line with the best practices. All these are the areas where sustainability must essentially be viewed in the context of long-term issues.

The challenges that come to the fore among other things are stepping up the income, curbing interest expended and operating expenses, credit risk, diversification in banking activities, portfolio investment, payments and settlement systems, and so on. Such unsettled issues and cognizable dilemmas need to be resolved on the basis of resource-mix, investment opportunities, demanding standards of customers and patterns of shifting value to streamline the banking system as an integral part of the blueprint of development.

Box 1: Risk in Banks

To get profit without risk experience without danger and reward without work is as impossible as it is to live without being born.

– A P Goether

For the banking fraternity risk, clearly, is a tiger to ride. All these days' bankers saw risk as something that needs to be controlled or minimized. This approach led to a limited view of viewing risk. In the present banking scene where there is unlimited risk; there is unlimited opportunity, too. The time is ripe for bankers to learn to manage risk for maximizing value.

In the uncertain, volatile and fast changing business environment of the 21st century, banks have to learn to cope with risks of every kind. In a protected market, risk meant one of two or three major things – hedging one self. One was not to worry too much about operational risks, technology risks, political risks, legal risks, contract risks, regulatory risks, strategic risks, and a host of other risks. Basel II has thrown new challenges to the banking industry in managing hitherto un thought of risk areas.

Just setting up a risk management department is not risk management. It's about entrenching a risk culture across the bank. If risk creates opportunities, opportunities create value. Many companies try to minimize risk instead of maximizing value. Risk minimization can destroy value. We may have to change tack – Risk avoidance to Risk consciousness. The twin objectives of risk management are to manage risk and to be seen managing risk. It is all about actualities and perceptions.

The first step for bankers is risk identification. The next step is to priorities these risks after profiling them. Then come the 3M approaches of measuring, monitoring and managing risks. Banks need to reorganize and set-up risk management committees and project themselves as safe bets to the stakeholders.

Source: ICFAI Research Center.

The ongoing financial sector reforms have also brought about a major cohesiveness in the three markets – bank credit, money and security markets at the domestic level. The changed financial architecture has significant implications for corporate strategy, organization and performance necessitating a move for banks to become 'one-stop financial shops'.

The concept of risk refers to the degree of probability of the occurrence of an event that would disrupt the planned running of a process or operation. Once a particular or potential risk has been identified, it can be measured, and on the basis of that quantification, a strategy of risk management can be implemented. This concept of risk assessment and management works on the basis that not all risks can be completely eliminated. Indeed, given the cost of eliminating a risk and its probability, the management of risk means that some risks should be left as open risks.

One area where risk assessment and risk management is scrupulously employed is banking. The emphasis however has increasingly shifted towards an area of risk which is all encompassing-operational risk.

OPERATIONAL RISK

Operational risk is an area of risk that any reasonably complex enterprise will face, and is the risk wherein any systems, procedures, machinery or technology may cease to function adequately or even totally. It refers to the likelihood that these operating expenses vary significantly from what is anticipated, resulting in a decline in the net income and value of the company. The Basel Committee defines risk as "The risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events." A new focus of the Basel II Accord is operational risk as per which a bank will be required to make capital allocations for operational risk from the year 2005. The shortcomings of banks made it imperative for them to protect themselves against the operational risks for the benefit of stakeholders and the constituents. From the perspective of capital adequacy, this risk covers technology risk, management/people oriented operational risks and legal risks.

Operation risk covers some of the key drivers of Basel II. These relate to technological advances leading to emergence of new financial products (through risk unbundling and rebundling) and new ways of delivering them (e-finance), progressively larger deregulation, particularly in emerging market economies, demographic changes and the nexus of increased competition, enhanced search for shareholder value and spread of financial safety nets.

These forces and their interactions have been reflected in securitization (commoditization of credit, and its associated risks and their sale and purchase in the marketplace), globalization and consolidation in the financial services industry. But Basel II Accord is an evolving process to handle financial innovation and increasing cross-border flows triggered by rapid technological advancements. Systemic reform of the banking system necessitates streamlined risk management, adequate capital provision, sound supervisory and regulatory practices, transparency and macroeconomic stability.

Banks and other financial players have been restructuring their working to circumvent regulations and meet the perceived demands of the customers' needs. Financial innovation of securitization and globalization and improved new technologies are nothing but extension of response by the financial institutions in the making of new products, consciously or otherwise. In addition to operational risk banks face financial risk. Finance being the core of banking business managing this risk becomes very vital for the industry.

FINANCIAL RISK

Assessing and measuring financial risk is the core business of the banking sector. Banks face financial risks in many forms. They are – Credit risk, Liquidity risk, Interest Rate risk, Market Risk and Foreign Exchange Risk.

Credit Risk occurs when a customer, who has been lent money, defaults.

Liquidity risk covers the possibilities when the patterns of banking activity may lead to a scenario wherein the bank simply does not have enough liquid funds to meet its liabilities at a given time.

Interest rate risk may arise when central bank interest rates may move away from where any given bank has assumed such rates will be for the purpose of setting rates for their own lending.

Market risk and foreign exchange risk are similar to interest rate risk in that market values and exchange rates may move out of line with expectations, and thereby underlying financial decisions.

Fundamentally, the major financial risk is the solvency risk, i.e., the bank may not have enough assets to meet its liabilities, and is measured in terms of available capital as against all risks. Financial risk management is, therefore, the process of assessing all the risks that a bank is exposed to, assume that all risks generate potential losses, and then work out a level of capital adequacy that a bank must maintain that will satisfactorily protect the bank from these risks.

In the past, risk was not given the kind of focus it is being given now. Most instruments had low leverage towards risks and consequently trading losses were less. Now, risk has become an integral part of any business. They are hedged by sophisticated tools. Increase of leverage in instruments has further complicated the risk management of banks because the same will have its effects on other risks such as credit risk, operational risk, etc. In this context banks/corporate have begun to seek for comprehensive solutions. This change in the way risk is managed is complimented by the regulators through corporate risk management systems, disclosures of risks, etc.

There is marked change in the total outlook of the financial institutions and more specially the banking industry with regard to their focus on the risk management systems as the same sounded good from the business point of view. This has influenced the changing attitudes in the risk taking by these companies and consequential risk management process. The companies started using new methods and new technologies. Even the corporate image and culture are redefined by these changes for enabling better procedural handling of risk factors.

Every financial institution is unique in its identity and composition of various features. Therefore, it is very difficult to implement any risk management strategy on sound lines. The unique features in each of the banks/financial institutions make it more difficult for uniform application of solutions.

Corporate Culture

A well-formulated risk management strategy in a bank is dependent upon some fundamental aspects of the company like the corporate culture, its procedures and technology. Any amount of regulatory intervention or force will not make the bank comply positively with regard to controlling of risks unless, their staff members themselves respond positively to the corporate needs and change their individual and collective outlook and attitude towards risk control and their decision making and cooperate in the corporate practices.

The Role of Procedures

Procedures including technology play a vital role in the execution and evaluation of a company's strategy towards risk management. Sometimes certain procedures will be followed out of sheer need and indispensability regardless of their effect on risk. Some practices are developed out of habit over a period of time and get established irrespective of their role in the management. Certain procedures empower the manpower at different strata. They need not be systemized codes or rulebooks. They can as well be directed to the activities and attitudes. The strength

of procedures depends on whether the unit/organization staff take those procedures in the right perspective with faith in their efficacy and the staff's responsibility and dedication to their individual and collective role. The importance of procedures and technology lies in formalizing the strategy of risk management. Lack of procedures will put the individual members in difficulty and there is ample probability of differences in opinions and decisions. Consequently, the making and implementation of such decisions are affected leading to the personal risk to managers and directors. A procedure is motivator and driving force for the efficacy and efficiency of machines and people respectively. Lines of reporting, trading authority and risk limits are certain examples in procedures. There is every need for periodical review and revision of procedures. Certain exigencies prompt contingent solutions for warding off the risks and there is every possibility of their becoming a risk factor in future if the same are habitually resorted to indiscriminately.

SYSTEMIC RISK

In recent years the financial sector, that includes in particular many central bankers, has become concerned with the concept and possibility of systemic risk in banking and financial markets. Systemic risk is the possibility that an entire system, such as international banking, may cease to function adequately or at all as a system. Systemic risk is therefore, a particularly serious (even catastrophic) risk because of its magnitude. The concern is that although systemic risk is clearly conceptually possible in banking, increased globalization and use of Over-the-Counter derivatives in modern banking meant that the risk of this possibility is markedly increasing. If that is indeed the case, the banking and financial sector must take very serious measures to understand systemic risk better and to attempt to manage this risk.

In 'Debt, Financial Fragility and Systemic Risk' E P Davis offers this definition of systemic risk: 'systemic risk', 'disorder', or 'instability' are used to describe a disturbance in financial markets which entail unanticipated changes in prices and quantities in credit or asset markets, which lead to a danger of failure of financial companies, thereby threatening to spread so as to disrupt the payments mechanisms and capacity of the financial system to allocate capital'.

Kaufman and Scott in 'What is Systemic Risk and Do Bank Regulators Retard or Contribute to it' define it thus: Systemic risk refers to the risk or probability of breakdowns in an entire system, as opposed to breakdowns in individual parts or components, and is evidenced by co-movements (correlation) among most or all of the parts. Thus, systemic risk is a particular risk in banking and financial markets because there is a strong interconnection between all the agents in the system. An inter-bank clearing market in itself establishes strong interrelations among the banks involved.

Further, investment banks will attempt to lay-off risk from major projects by packaging the debt and selling it to other investment banks and financial institutions. In addition, relatively recent developments in terms of banks using highly leveraged speculative derivatives, increases the severity of a risk to the whole sector from economic shocks. In this way, the banking and financial sector is inter-twined with strong and interdependent obligations and liabilities. The real risk of a bank suffering solvency risk is not the collapse of a bank, but the risk is that it will take many other banks with it, and ultimately bring the whole market down.

Kaufman and Scott identify three systemic risk scenarios in banking and financial markets.

- First, a macro-shock may cause a systemic risk of market collapse. A macroshock is something of the order of an outbreak of war or a major environmental catastrophe. This may cause systematic collapse because it may actually justify it, but more likely it is the disruption to the availability of reliable and up-to-date information that makes rational decision-making difficult and a market herding panic inevitable. The relationship between the macro risk and the systematic collapse is, thus, one of direct causation. Such risks are relatively unlikely, and are, in practice, almost impossible to control through affordable risk management.
- The second form of systemic risk they identify is the 'domino effect' risk. This is a particularly severe risk in a system characterized by strong interdependence of agents. As the name suggests, the risk is that - one relatively minor event may set in a whole series of minor and major events that are unstoppable once started and cumulatively leave such an impact that it will collapse the system. Kaufman comments: 'It is the probability that cumulative losses will accrue from an event that sets in motion a series of successive losses along a chain of institutions or markets comprising a system. That is, systemic risk is the risk of a chain reaction of falling interconnected dominoes'. Thus, for example, one bank may go insolvent owing a significant sum to another bank, but it is severe enough to push the latter bank into insolvency as it owes a significant sum to another bank, and so on. This is a very severe systemic risk where there are strong networks of financial cross-liabilities and cross-holdings between institutions in a system. It is similar to a macro shock risk in that there is an element of direct causation, where one insolvency directly causes a whole 'domino fall' chain. However, it differs from a macro shock in that there is a particular correlation amongst the agents that are directly affected, though the end result of system collapse will be often the same.
- The third form of systemic risk is 'contagion' risk. Again, like the 'domino effect' the risk in a system is that relatively minor event initially may go on to have serious spill over effects. However, in contagion risk what is seen is systems breakdown through the gradual and chaotic spread of a disturbance via often indirect connections. It is the sort of risk that demonstrates correlation, often through only indirect causation. Kaufman and Scott comment that it emphasizes similarities in third party risk exposures among companies involved. When one unit experiences an adverse shock from, say, the failure of a large financial or non-financial company that generates severe losses, uncertainty is created about the values of other units potentially subject to the same shock. Therefore, such a contagion system risk can, if the contagion is serious enough, cause a system collapse through correlation and causation meshing as a 'domino' risk.

However, what may be more significant in contagion risk is that the system reacts to the contagion disproportionally. The contagion event causes not just agents in the system to become directly exposed to a known fanning out of losses, but causes those agents to re-evaluate, and more specifically doubt the quality of the information they possess on other agents and the market. For example, if one bank collapses through losses to a defaulter country, the entire banking sector looks risky until it can be established that no one else has large exposures to the defaulting country. It is precisely this period of doubt that must be considered as a systemic risk, because the spread of a general doubt in the strength of a system may itself perversely precipitate that very collapse. The particular problem is that in this contagion even sound and reliable agents will also be effectively damaged, perhaps fatally, just as the guilty and unreliable agents.

RISK LIMITATION

Before studying the response from the industry for risk we shall discuss in brief what risk limitation in a bank is all about.

Risk limitation is a part of risk management. In order to limit a risk, the bank should first find what amount of risk it can absorb. In other words, it is called the bank's risk capacity or the maximum unforeseen loss that the banking company could suffer and still manage to keep itself afloat. The overall limit set for the bank will be divided among the different segments and clients keeping their size and features in mind. Any calculation in this direction will necessarily take into consideration the bank's properly valuated reserves, which were set specifically for the purpose of covering the unexpected. In practice, not all risks can be quantified and at the same time not all risk-saving expenses can be estimated and justified. The bank should endeavor towards balancing the actual data versus the planned data using the right techniques of measuring and quantifying the risks on uniform basis.

It is to be understood that in the complex and multifaceted management process of risk management, the element of risk-taking is an integral part. This process requires continuous planning, supervision, review and revision as per the needs of the time.

Throughout the consolidation phase of 1990's, banks relied on three primary strategies to create shareholder value. They are:

- **Risk reduction** Securitizing a greater number of the loans they originated, as well as other assets sitting on their books.
- **Revenue diversification** Expanding their revenue base through additional sources of non-interest income.
- Consolidation Capturing economies of scale and scope through acquisitions and mergers.

Although initial results were impressive, the returns from these strategies have now flattened – and a few undesirable consequences have emerged. Alleviating risk through the sale or securitization of assets had the unpleasant side effect of putting even more distance between banks and their customers. Further growth in fee-related income through the introduction of service charges worked against the need to cultivate customer loyalty. And a decade full of mergers and acquisitions left banks with organizational, process and system complexity, which placed enormous strain on operational efficiency and financial performance.

With all these changes, banks are still largely operating with the same traditional business structures where distribution occurs through product silo and operations are biased toward internally manufactured products. Within this structure, even leading banks cannot seem to squeeze out any more cost, and customers generally see very little or no differentiation among banks. Given their financial challenges, banks cannot afford to have capabilities duplicated across product silos, with each product operating its own processes, systems and product-specific channels. And although they offered increased efficiency, vertically integrated supply chains limited customer choice, leaving companies with an undifferentiated value proposition and lower overall customer wallet share. It's no surprise that banks are moving away from the confines of their historical business structures. But with value continuously shifting to different parts of the value chain, many banks are struggling, unsure which areas of their business matter most and also uncertain where they are heading. With the dynamics of the future unclear, it only makes it more apparent that banks will need:

Greater focus on what differentiates them from the competition, less attention – and spending – on commodity-like functions.

Heightened responsiveness to ongoing changes in the marketplace, more empowered customers and increasingly complex demands from regulators and stakeholders.

Variable cost structures that allow banks to accommodate fluctuations in market demand and product preferences while improving financial position through lower cost structures.

Improved resilience to counteract increased internal and external uncertainty and marketplace volatility – whether protecting your business from shocks such as natural disasters, privacy and security threats and geopolitical events or addressing everyday challenges like business expansion and credit risk.

The question is: How will banks reach that enviable position? Two primary paths seem clear – one involves the industry as a whole and the other is traveled by individual banks. As an industry, banking is moving away from a set of independent, vertically integrated institutions toward a network of affiliated financial institutions. At the same time, individual enterprises are reconstructing–breaking product silos into small, encapsulated business components that can be shared across the enterprise.

In fact, the confluence of these two paths is propelling banks toward an on-demand operating environment where a bank's business structure and supporting business processes become flexible enough to respond rapidly to virtually any customer demand, market opportunity or external threat.

Box 2: The Enterprise-wide Approach to Risk Management Strategies for Weathering the Corporate Storm

The calculation of risk has always been central to managerial decision-making, but today executives are acutely aware of the need to deal proactively with uncertainties that can threaten their business.

Risks are often closely connected. Operational risks, for example, can quickly evolve into market risks if word gets out and the share price falls.

The regularity of such incidents along with high-profile corporate scandals – such as those happened at Barings Bank, Enron and Worldcom – provoked a response from regulatory bodies throughout the 1980s and 1990s.

The Basel Committee for Banking Supervision, the Europe-based regulatory body, and the UK's Turnbull Committee now recommended corporations and financial institutions to adopt a more thoroughgoing approach to risk management, otherwise known as Enterprise Risk Management (ERM).

ERM is a systematic way of understanding and managing the various risks a company faces. How is it carried out? First, managers must identify business risks the company faces at all levels, from the Board of Directors to line managers.

This may not be as straightforward as it seems because people tolerate different levels of risk within each company.

Also, while an ERM framework offers the prospect of a transparent and consistent language of risk throughout organizations, most companies have yet to speak such a language. A May 2002, survey of executives by McKinsey revealed that 36 percent did not fully understand the risks that their businesses facing.

While identifying the risks, managers should consider three broad categories. First, financial risks can be created by market fluctuations or changes in the status of the company's creditors.

There are methods for reducing such errors.

Manufacturers such as General Electric have initiated programs such as Six Sigma, which aim to reduce the number of errors radically in a given production cycle.

Businesses are exposed to business-volume risk when they suffer unexpected changes in the demand for their products and services, their supply structure or the competitive environment.

The second step in ERM is the assessment of risk. Advanced techniques in risk modelling – such as decision analysis, Value-at-Risk calculations and scenario planning – allow managers to gauge the likelihood of certain events.

The final step is the most crucial: once risks are identified and evaluated, they must be managed. There are typically two options here – using internal resources, such as self-insurance, or transferring risk and sharing it with another party.

Managers can also bundle together different types of risk and trade these with other parties. In 1997, for instance, the technology company Honeywell took out an insurance policy that bundled property and liability risks against currency risks. The initiative helped the company cut down its risk management costs by more than 15 percent.

A well-managed ERM policy encourages a common language of risk among board members, managers, suppliers, customers, investors and so on. It helps people at the front line – who spot warning signals of potential problems - to communicate them more quickly to those who can decide to take evasive action.

ERM does not impose a centralized decision-making process for risk management. On the contrary, it is designed to increase accountability for risk in each and every business unit.

What does it take to put an ERM policy into place? First, no risk-related initiative can be launched without high-profile commitment from senior managers. This might mean regularly communicating on risks with employees and outsiders, such as investors or suppliers.

Second, risk awareness must be part of the corporate culture. The question is how can you achieve this? One answer is to appoint a Chief Risk Officer (CRO), whose prime function is to make risk management a central part of the business.

ERM often exposes unforeseen risks to the company and challenges managers to look for enterprise-wide solutions. Done well, it frees up company resources and capital reserves for activities that can raise shareholder value.

Integrating risk management into day-to-day operations, rather than letting employees react to risks as they crop up, makes it a source of competitive advantage.

Source: Ayse Onculer, London, September 02, 2001, Business Standard.

IT IMPLEMENTATION CHALLENGES

Although product and service silos still have a stronghold within most financial services institutions, the monolithic view of the enterprise is fading, as is vertical integration. Whether of their own volition or spurred by new players arriving on the scene with significantly improved value propositions for particular parts of the value chain, companies are beginning to specialize. They are selecting a more specific industry role – manufacturing, distribution, risk management or processing – that suits their strengths and turning externally (or internally to other business units besides their own) to supplement weak capabilities.

In most financial services industries, the shift from vertical integration to a networked structure usually begins with distribution as companies seek additional outlets for their manufactured product. The banking industry is no exception to this trend. More and more banks are moving towards total branch computerization and anywhere and anytime banking.

Although the role of information technology in cutting costs and boosting productivity has been well documented yet, the link between IT and risk management has not been properly developed. As the complexity of transactions increases, people find it difficult to understand and monitor the risk involved. A good IT infrastructure is required besides other needs, to make information available on a timely basis so that the senior management can take stock of the situation and frame suitable risk management strategies. In fact, by not investing in information systems, a bank could be assuming major risk.

Box 3: Information Technology (IT) Risk in Banks

Banking is a business which is full of risks. Lot of attention is given to credit and market risk by banks ignoring operational risks. Operational risk is because of failure of man, machine or systems to operate as expected. With more and more implementation of Information Technology based systems, the chances of IT related operational risks have increased day by day, unless some measures are not implemented. Banks have to identify the risks from the increased usage of computerization and automation in their processes as the types of controls required to manage the risks are different form the manual systems.

Nature of IT Risks

The IT risks can be classified under (a) IT environment risks, (b) IT operations risks and (c) Product/service risks.

- a. **IT Environment Risk:** Regulatory Risk, Strategic Risk, Organization Risk, Location Risk and Outsourcing Risk arise due to the commercial and business environment within which the computer and telecommunication systems are operating:
 - i. *Regulatory Risk:* Regulatory breaches can result in diminishing reputation, increased cost of capital, limited business opportunities and punitive action, which banking operations may ultimately end up in loss.
 - ii. *Strategic Risk*: The bank may not be able to achieve its effectiveness and loose competitive edge and may place too much pressure on the bank's IT resources to adapt to new business environment, as new products and services come on-line when a bank adopts inappropriate IT strategies.
 - iii. Organization Risk: When the organizational structure fails to provide and define reporting lines and responsibilities for the IT functions, it can lead to misunderstanding of responsibility and a poor distribution of human and financial resources.
 - iv. *Location Risk*: Depending on the location of a bank's data processing activities it can be susceptible to natural events such as floods, earthquakes, storms and other events like riots or sabotage.
 - v. *Outsourcing Risk*: The responsibilities and liabilities of vendor and client may not be clear without proper management control and documentation. Over reliance on single vendor/supplier increases the risks from their failure and may lead to unacceptably high costs.

- b. **IT Operations Risk:** Error Risk, Computer Fraud Risk, Disclosure Risk and Interruption Risk are the risks, which arise from transaction processing on computer systems.
 - i. *Error Risk*: Errors may affect the completeness and may end up resulting loss to the bank, which are made during the development and modification of computer programs simple error in data entry or misuse of some tools.
 - ii. *Computer Fraud Risk*: The risk is due to the ease with which the fraudsters hide their actions in the system especially during times of business and system change. Such risks are more likely when the security and control systems are weak or not properly implemented.
 - iii. Disclosure Risk: Information passed on communication network includes very sensitive and financial and other data of customers. Bank can have negative impact and reputation if the information is disclosed intentionally or accidentally and may loose its customers.
 - iv. *Interruption Risk*: The failure of discontinuity of computer operations may lead to interruption to the bank's operations and customer's dissatisfaction and loss of business. If the computer related infrastructures are not secured there will be much impact on the business continuity.
- c. **Product/Service Risk:** The services offered by banks like Automated Teller Machines (ATMs), Electronic Funds Transfer (EFT), etc. are required to be available to the customers without any disruption. The operational risks associated with these products remain fundamentally unchanged. The way in which management design and implement a control framework to mitigate these risks is different to manual processes.

Since only a few large companies will be able to span the full range of products in a vertically integrated manner, most companies will focus exclusively on areas where they have comparative advantage. Distributors will own the customer interface, while specialists with deep product expertise will develop new products based on segment-specific customer insights that the distributors provide. Companies will take advantage of scale efficiencies offered by selected processors – perhaps even tapping into low-cost labor pools overseas.

Technology has been one of the major enabling factor for enhancing the customer convenience in the products and services offered by various banks. With the use of technology, besides improvement in customer service, banks have been able to tone up their management information systems, improving the productivity of their employees and profitability of banks.

Technology Aids in Risk Mitigation

The various types of risks in banking include:

- Liquidity Risk,
- Credit Risk,
- Product/Services Risk,
- Legal Risk,
- Exchange Rate Risk, and
- Operations Risk.

Source: www.rbi.org.in

Technology helps in risk mitigation in the following ways.

Liquidity risk can be controlled by proper deployment of technology for centralized operations with networking of branches, payment system reforms, implementation of technology-oriented schemes of RBI like electronic clearing services, electronics fund transfer, real-time gross settlement systems, centralized fund management systems, public debt office – negotiated dealing system etc.

Measures which can mitigate **Credit risk** include analysis of industry data, software-based preventive monitoring system for borrowal accounts, straight through processing, implementation of know your customer guidelines of RBI etc.

Product/Services risk can be controlled by proper customer relationship management, implementing data warehousing and data mining, proper market analysis emphasis on proper deployment of delivery channels. Technology has a major role in deployment of products and services.

Exchange risk can be mitigated by proper technology measures like integration of foreign exchange and treasury operations, trend and market analysis, computerized dealing room operations, straight through processing initiatives etc. Technology measures to mitigate **Legal risk** include having proper data as to compliance of various laws and regulations, maintenance of proper records, Information Technology Act, proper contract management, cyber forensics, implementation of digital signatures etc.

Technology Induces Risk

Though Technology aids in risk reduction, the use of technology also induces additional risk in the operations.

The Information Technology risk can be classified as:

- IT Environment Risk, and
- IT Operations Risk.
- IT Environment Risks include:
- Regulatory Risk,
- Strategic Risk,
- Location Risk,
- Outsourcing Risk, and
- Organization Risk.

Mitigation of Regulatory Risk

Financial and business regulations of statutory bodies like the central bank, government etc., are to be complied with and there should be proper mechanisms to monitor compliance. A systems development methodology to take care of compliance requirements has to be adopted. Regulations and laws regarding compliance can be incorporated into operating procedures within the underlying IT systems. Contractual arrangements are to be put in place to overcome legal deficiencies in the absence of adequate legal framework.

Control Measures for Strategic Risk

The following measures will help in reducing the strategic risk. IT strategy and plan in alignment with the business strategy, planning, budgeting and review of IT resources by top management, capacity planning, review and monitoring, operational plans and budgets that specifically identify the IT component, performance targets for IT with proper monitoring and review mechanism. Periodic review of policies and procedures, project planning including management and review etc.

Measures to Mitigate Location Risk

These include a regular review of the location of IT resources, disaster recovery plan, business continuity management, operational procedures for physical access controls, Operational procedures for monitoring the environment like temperature, humidity etc., periodic review of ambience will also help in controlling the location risk.

Outsourcing Risk Management

The measures include proper review of outsourcing strategies including costbenefit analysis, prescribing minimum standards to which suppliers/vendors should confirm, service level agreements and monitoring, incorporating clauses in contracts reserving the right to audit vendor's premises, controls in supplier's premises over the completeness, accuracy, integrity of processing and security of IT systems, non-disclosure agreements etc.

IT Operations Risk

With full computerization of bank branches, banks are increasingly dependant on information technology for their day-to-day operations. This has increased the risk due to business operations. The following types of risks are associated with the information technology operations.

- Error Risk,
- Fraud Risk,
- Disclosure Risk, and
- Interruption Risk.

Interruption Risk

Errors can happen due to wrong or incomplete data entry, wrong programming of the application software, malfunctioning of the systems etc. Frauds can also happen due to connivance of persons who know these errors in the systems or due to lack of awareness or laxity in implementation as regards the compensatory controls that need to be put in place. Unwarranted disclosures can happen if proper access controls are not implemented. Improper maintenance of systems may lead to disruptions. Implementation of the following controls will help in reducing the risks in IT operations.

Error Risk in IT-Controls

- Single point of transaction entry,
- Data integrity controls,
- Testing and quality control,
- Monitoring data conversion process,
- Application level access controls, and
- Change management and control.

Fraud Risk in IT-Controls

- Access controls,
- Confidentiality of passwords,
- Segregation of duties and job rotation,
- Encryption and authentication checks,
- Exception reporting,
- Information security measures,
- Secure backups, and
- Periodic audits.

Disclosure Risk in IT-Controls

- Data classification depending upon sensitivity,
- Controlled access to information on need to know basis,
- Encryption of sensitive data,
- Procedures to prevent unauthorized removal of data,
- Application controls, and
- Implementation of digital certificates and digital signatures.

Interruption Risk in IT-Controls

- Redundancies to avoid single point of failure,
- Monitoring of down time,
- Testing of contingency plans/disaster recovery plan,
- Succession plan for key appointments,
- Information security controls,
- Business continuity plan and implementation,
- Capacity planning and monitoring, and
- Testing of incidence response plans from time to time.

Implementation of BS7799, COBIT Framework of ISACA etc., will help in litigation of risks due to technology implementations.

Most critical of all, the customer too benefits. With access to best-of-breed products through a variety of distributors and improved customer service, customers are no longer forced to choose between seamless service and a superior product. As additional businesses start to deconstruct and bank revenues shift, banks will need to leverage their biggest asset: their customer base. In order to do this, banks will have to revisit their current business structures, looking to capitalize on hidden efficiencies and leverage customer relationships across their enterprises.

Risk management lies at the core of the bank's business strategy. It is wrong to view risk management as a field which deals with credit risk, interest rate or exchange rate movements. Rather, risk management is all about reducing vulnerability by making sure that cash is consistently available to make value adding investments and providing the stakeholder the best possible returns.

SUMMARY

- Banks in India had to change the old ways of doing business due to factors such as technological advancements, disintermediation pressures arising from a liberalized financial marketplace, increased emphasis on shareholder value, and macroeconomic pressures and banking crises after globalization in the 1990s. Consequently, banks and other financial institutions were compelled to adopt comprehensive risk management practices, due to the everincreasing competition as well as stringent regulatory norms.
- Risk assessment and management works on the basis that all risks cannot be completely eliminated. Indeed, given the cost of eliminating a risk and its indispensability, the management of risk means that some risks should be left as open risks. Banks face two major types of risk – operational risk and financial risk. Every bank is unique in its identity and composition making it difficult for implementing any uniform risk management strategies.

- A well-formulated risk management strategy in a bank is dependent on some fundamental aspects like the corporate culture, procedures and technology. The importance of procedures and technology lies in how successful they are in formalizing risk management.
- Risk limitation is part of risk management. The bank should first find what amount of risk it can absorb in order to limit its risk exposure.
- Risk reduction, revenue and diversification are three key primary strategies banks rely on to create shareholder value.

<u>Chapter XII</u> Enterprise-wide Risk Management in Banks

After reading this chapter, you will be conversant with:

- The Necessity of ERM
- The Process of ERM
- Measurement of ERM
- Transfer Pricing
- Cases in ERM

Risk is an inevitable part of banking. Essentially, successful banking practice tantamounts to successful management of different types of risk. In today's increasingly complex financial services environment, the nature and degree of risk to which all financial institutions are exposed, irrespective of their size, place, or business strategy have multiplied many times over. While it is to be acknowledged, that different institutions face different types of risk, depending on their business strategy, size, complexity of operations and other factors, all financial institutions need to develop a comprehensive risk assessment and management program. In order to aid financial institutions in developing programs to assess and manage risk, one can take into account several categories of exposures common to modern financial institutions, including strategic risk, credit risk, interest rate risk, liquidity risk, market risk, legal risk, reputation risk, compliance risk and operational risk.

The question that immediately surfaces is why this surge in both risks and risktaking among financial institutions in every size category? It could be so due to the following reasons:

- a. The Gramm-Leach-Bliley financial modernization law opened the door to new and usually unfamiliar business lines for financial institutions, such as insurance agencies, finance companies and pay-day loan subsidiaries.
- b. Financial products have become more complex and they include interest options, such as floors, caps and other such associate products.
- c. Competition, particularly from non-traditional entities, and profit pressures have increased, resulting in greater risk-taking as financial institutions wrestle over marginal credits.
- d. Non-maturity and short-term deposits have increased significantly as equity prices have fallen, increasing liquidity and interest rate risks.
- e. Customers possess numerous rights, including the right to information privacy.

Apart from this, technology has altered the risk equation, thereby in mitigating some risks and adding new ones. In fact, there is some degree of risk in just about everything a financial institution does. In today's risk environment, an enterprisewide risk management plan that effectively identifies and assesses the potential impact of risks, provides appropriate tools and methods for monitoring risk, and employs effective risk control strategies, is a necessary element of any responsible management structure.

THE NECESSITY OF ENTERPRISE RISK MANAGEMENT (ERM)

Risk management is a basic business necessity for financial institutions of all sizes, and ultimately central to their success and survival. It is a core activity, affecting every aspect of the business. As such, enterprise risk management is simply not an option. It is a must for any organization that is facing risk. It integrates an organization's internal and external business processes by applying standard risk terminology, metrics and reporting to facilitate optimal risk/return decisions. An enterprise wide approach to risk management centralizes the process of supervising risk exposure so that organizations can determine how best to absorb, limit or transfer risks. It is an ongoing business process that calls for standard definitions and methods to identify measure and manage risk across all business units. This information can then be analyzed to determine the overall nature of organizational risk exposures, including their correlation, dependencies and offsets.

Enterprise risk management can go beyond reducing risk and actually help find ways to capitalize on the upside potential of risk. To do that, however, organizations must thoroughly understand the processes of risk in order to make informed decisions about retaining, financing or transferring risk.

These decisions require a standardized, enterprise-wide approach and integrated reporting so that the organization always has a consistent and timely view of its exposures.

When properly implemented, enterprise risks management:

- Aligns the strategic aspects of risk with day-to-day operational activities.
- Facilitates greater transparency for investors and regulators.
- Enhances revenue and earnings growth.
- Controls downside risk potential.

THE PROCESS OF ENTERPRISE-WIDE RISK MANAGEMENT

The process of enterprise-wide risk management consists of:

Strategy: Integration of risk management as a key corporate strategy.

Organization: Establishment of the Chief Risk Officer position with his/her accountability to the board of directors.

Process: The process of identifying, assessing, controlling and financing risk must be common across the enterprise.

Systems: Risk management systems must be developed to provide information and analytical tools to support the enterprise risk management function.

Measurement of Enterprise-wide Risk Management

In order to control risk, one must first measure it. Measurement is critical to validating management processes and improving internal discipline. As more business processes become electronic, identifying and responding to risk must become faster. In view of the potential impact and service requirements, risk management has become a real-time concern. Without an enterprise-wide approach that includes standard data definitions and integrated reporting, institutions cannot develop the consistent and timely view of risk exposures necessary for management decision-making. To comply with wide-ranging regulatory demands, financial institutions must understand, control and report risk across the enterprise. Management is being held legally responsible for identifying and managing risk. At some point, rating agencies will likely establish a risk management rating for companies in addition to existing financial ratings.

Regulatory requirements will be an influence, but business challenges will provide the primary impetus for risk management, because effective risk management is good business management. Some of these business challenges include:

- Evolution of the real-time business environment.
- The developing global marketplace.
- Concern about business continuity and operational reliability.
- Continuous and accelerating technological change.
- The need to limit earnings' volatility and enhance shareholder value.

More broadly, the Bank of International Settlements – under the New Basel Capital Accord has proposed worldwide capital requirements for banks related to credit, market and operational risk. However, it is up to each country's central bank to determine the extent to which the New Accord will be adopted. As proposed by the Bank of International Settlements, the minimum capital requirement could increase significantly unless a bank takes advantage of the more sophisticated internal measurement options offered under the New Accord. To qualify for lower capital charges, banks must show they have appropriate processes and methods in place, supported by sufficient historical data. This will require them to demonstrate compliance with a number of expected standards relating to identifying, measuring and controlling risk, which will happen only if risk practices are integrated across the enterprise.

However, institutions can qualify for the internal measurement approach by having five years of historical data and suitable risk management processes in place by 2004. This is a major hurdle for banks and other traditional financial institutions, many of which have silo-based structures that impede compliance with the new regulatory demands.

Requirement of a More Integrated Approach Towards Risk Management

Most financial institutions are saddled with cultural limitations and business unit boundaries that make it difficult to identify and collect risk data, so they are a long way from having an integrated approach to risk management. Stand-alone legacy systems with application-centered data make workflow connectivity and information sharing nearly impossible. Consequently, it is not possible to collect common data, identify risk interdependencies or exposure trends, and assemble a complete, accurate and timely overall picture. Considering the critical role that finance will play in compliance with the accord, integration between finance and risk management is particularly important. Most banks monitor loss events, but many do not actually collate the information into a loss database. Data is not captured on a continuous or consistent basis or at a sufficiently granular level, and as such events are not linked across the organization. Most operational risk (the risk of loss from failed or interrupted business processes) data has been limited to activities that can be observed and quantified, with the emphasis on failures of the system, not failures of the process. However, measuring and managing operational risk requires an understanding of the complete organizational workflow, including how process deficiencies or events outside the enterprise may lead to operational losses. This dovetails with corporate efforts to achieve straight through processing, which requires the same analysis but for a different purpose. Like Straight-Through-Processing (STP)¹, enterprise risk management requires the simultaneous sharing of information - something a sequential processing structure cannot deliver. It is necessary to capture transaction information at the point of execution and to consolidate that information across business lines by exposure category (e.g., counterparty, country, currency, etc.). To support additional risk decisions, that information must be made available in real time. Much of the risk analysis, particularly related to operational risk-relies on historical data. While organizations must maintain a database of risk incidents and near-misses, past experience may not always provide value as an indicator of future risk exposures (e.g., understanding the risks in establishing an e-business channel).

In addition, historical data is often optimized when producing distribution curves so that anomalies are smoothened out. Lower-frequency risk events that fall into the tail of the distribution curve are important elements for determining exposure and conducting risk scenario analysis. Predictive risk management requires monitoring of key indicators for operational, financial and business processes at specific points in time. Monitoring this information on a real-time basis and in aggregate provides insight into emerging trends. It diminishes the possibility of failures gaining momentum and permits an accurate view of the risk level for the entire organization.

Many of the components of an enterprise risk management program already exist within most organizations. In fact, components are frequently replicated within many different business units. Multiple silos track the same type of exposures but do not share information. An enterprise view looks at the components holistically. In addition, information relating to operational risk is not fully understood and consequently never recorded or reported up the management line. Historically, few business units report risk directly to the board of directors.

With enterprise risk management, those who focus on risk within their areas of expertise will continue to do so. Most day-to-day risks will be managed by the business units where the risks originate. Unit managers are in a better position to understand and influence the range of risks and thus should be accountable for managing risk levels.

¹ Straight Through Processing (STP) is a system that facilitates faster and smoother processing of transactions in stock markets without manual intervention.
Practical Benefits

Financial institutions need an enterprise risk framework to relate capital reserves more effectively to their actual level of risk exposure. By aggregating and analyzing risk by type and across lines of business, they will be able to quantify the amount of capital required to absorb unexpected losses.

Enterprise risk management also contributes to better business performance for companies in all industries. Net income and return on investment or equity are commonly used to compare business performance, but they do not consider the level of risk taken to achieve those results. However, a risk-adjusted rate of capital (RAROC) can be determined by dividing a unit's net income by its economic capital, producing a profitability measure that is common across business units. A risk-adjusted return that is more than the cost of the related economic capital employed contributes value to the organization and its shareholders. The RAROC approach can also be extended to evaluate pricing decisions and product profitability, and to differentiate between relationships that make money for an institution and those that do not.

Against a policy that establishes the level and types of risk an organization is willing to absorb and the content of its risk portfolios, RAROC is also an important factor in making risk transfer decisions. The benefit of potential risk transfer strategies can be determined by comparing the potential decrease in economic capital and risk of loss against the cost of insuring or hedging the position.

Asset-liability Management and ERM

The past decade has seen financial institutions make great strides in managing the risk of their trading books and implement sophisticated systems that enable them to measure their market exposures. Meanwhile, similar strides have been made for the banking book, with the use of asset and liability management (ALM) systems to monitor interest rate and other risks. But to make strategic financial decisions concerning the direction of the business and the allocation of capital, institutions have to bring these two views together. To achieve this, banks are looking to technology to combine the analyses of enterprise risk management (ERM) and ALM at a higher level, and thus a new generation of integrated systems is beginning to emerge. ERM systems first appeared around the beginning of the 1990s with the growth in the use of derivatives and the need for both an accurate assessment of the exposure associated with an individual instrument and for a consolidated measure of risk across the trading portfolio. The systems embraced mark-to-market for valuation and enabled the calculation of value-at-risk and other measures.

ALM systems appeared about a decade or so earlier to help institutions actively manage the asset and liability sides of their balance sheets. In the US, this meant primarily interest rate and liquidity risks, whereas in Europe and elsewhere it included foreign exchange, and often equity and commodity risk as well. The systems supported gap analysis (the difference between interest rate risks on assets versus liabilities), income simulation and other measures. But a view is gaining ground that although ERM and ALM developed independently and incorporate a number of different functions, the division between them is false. ALM has always dealt with risk management, but in a different way from risk managers of markettraded portfolios. It has always dealt with longer-term risk, typically, interest rate, foreign exchange and liquidity risk in structural books. These are non-trading assets and liabilities, primarily loan and deposit books. By contrast, risk management has focused on the shorter-term risk in trading books. Because ALM focuses on the long-term, the discipline encompasses two complementary orientations - strategically and tactically positioning the balance sheet based on the market outlook, that is, planning orientation, and assessing risk to the balance sheet should that outlook not materialize, that is, risk orientation. Risk management of trading positions does not involve a planning orientation and usually does not overtly measure liquidity risk. The calculations of ERM can be seen as a subset of ALM.

The Convergence of ALM and ERM: Banks seeking a truly complete view of their exposures are beginning to seek ways to integrate the enterprise risk management systems they use for their trading books with the asset and liability management systems they use for their banking books. A number of factors are forcing banks to face the problems that arise from a fragmented analytical approach and to review whether the division between their risk and asset and liability management makes business or technological sense. Perhaps the most compelling factor is the competitive climate of today's financial services, which means that banks have to view their capacity to bear risk as a resource and therefore should make business investment decisions based on the calculation of risk-adjusted returns.

To provide a deep insight into the prevailing ERM practices in banks all over the world, we provide in the appendix the ERM models of 5 international banks.

SUMMARY

- Financial institutions employing enterprise risk management have more options to finance and transfer risk exposures.
- Limited insurance coverage and higher premiums will result in organizations assuming more of their risks and paying more for those they insure.
- With a holistic view of risk, organizations, such as banks can identify natural offsets and can design plans to finance self-insurance programs.
- There will be increased use of captive insurance subsidiaries for the internal transfer of risk and non-insurance risk transfer vehicles, including the use of capital markets. Such a holistic approach to risk is supposed to increase share value through greater risk transparency and by minimizing uncertainty of return.
- Risk management is a primary corporate governance issue that has the attention of both investors and regulators. The recent frauds have raised the demand for evaluating management. ERM aligns the strategic aspects of risk with day to day operational activities. It facilitates greater transparency and controls downside risk potential.

Appendix I

Enterprise Risk Management at Lloyds TSB

Lloyds TSB is one of the leading players in the UK banking and insurance industry. It is involved in various businesses like retail and commercial banking, account management services for businesses and private individuals, debit cards, asset management and mortgage loans. The company faces many risks. These include Strategy risks, Change Management risks, Product and Service risks, Customer treatment risks, Operational risks, Legal risks, Regulatory risks, Credit risks, Market risks, Insurance risks, and Financial risks. The case outlines the risks and the mechanisms Lloyds TSB employs to deal with these risks.

- A V Vedpuriswar and Rajesh Kumar Singh

Lloyds TSB^1 , one of the leading players in the UK banking and insurance industry was involved in various businesses – retail and commercial banking, account management services for businesses and private individuals, debit cards, asset management, and even mortgage loans. It was also a leader in the field of insurance. Lloyds TSB was renowned throughout the world for insuring a wide range of risks, even the most unusual ones. With over 2,500 branches, Lloyds had expanded globally and had locations throughout the world. International business comprised nearly 20% of the bank's total revenue. To strengthen its competitive position, Lloyds TSB was expanding its asset management services, repositioning existing insurance, pension, and savings products, and reducing its workforce. In 2004, Lloyds TSB recorded sales of £9567 million and a net income of £2421 million.

Background Note

In 1765, John Taylor and Sampson Lloyd II founded Taylors and Lloyds bank in Birmingham, England. In 1852, the last Taylor involved with the bank died. In 1865, the bank converted to joint stock form and became Lloyds Banking Company Ltd. Over the next 50 years, it grew by merging with some 50 banks, becoming one of England's largest banks by the turn of the century.

After the First World War, the bank acquired Capital and Counties Bank (1918); Fox, Fowler & Company (1921); and Cox & Company (1923). During both wars, deposits grew while lending dropped. After the Second World War, growth was hampered by high inflation.

By 1971, Lloyds had branches in 43 countries. It moved into insurance (1972), home mortgages (1979), real estate agency services (1982), and merchant banking (1986). The bank sold overseas subsidiaries and acquired 58% of life insurer Abbey Life (1988) and Cheltenham & Gloucester Building Society (1994). In 1995, Lloyds bought TSB Group.

The TSB group's origin went back to the trustee savings banks (TSBs) formed in the 1800s. By 1860 there were 600 such banks, mainly in northern England and Scotland, but the number continued to decline with the passage of time. In 1986, when the four remaining TSBs (TSB Channel Islands, TSB England and Wales, TSB Northern Ireland, and TSB Scotland) agreed to merge and go public, TSB Group was born. In the late 1980s, the cash-rich group bought Target Group (life insurance, sold 1993), Hill Samuel (merchant banking), and other units. As debt rose in the 1990s, TSB Group refocused on banking and insurance.

¹ Lloyds TSB is unrelated to the world-renowned Lloyd's of London insurance exchange.

After the merger, Lloyds TSB focused on loans and insurance and dabbled in consumer finance, including the sale and delivery of big-ticket items (cars, large appliances). Returning overseas, it bought the consumer finance unit of Brazil's Banco Multiplic.

In the late 1990s, the bank overhauled its operations to eliminate redundancies and began rebranding under one green and blue banner. In 1999, Lloyds TSB bailed out Abbey Life, which had nearly gone bankrupt due to the cost of settling pension mis-selling claims.

In 2000, the bank bought Scottish Widows to boost its fund management services. It sold the Abbey Life name and its new business to Zurich Financial Services' Allied Dunbar. Abbey Life continued to service existing business for the bank. Lloyds TSB also bought consumer and auto finance unit Chartered Trust from Standard Chartered. After a year long battle to buy London-based mortgage lender Abbey National, the UK Government, in 2001, blocked the merger on anti-trust grounds. Early in 2001, Lloyds TSB closed Bahamas-based subsidiary British Bank of Latin America because of alleged money-laundering links.

Overview of Risks

Lloyds TSB had adopted an enterprise-wide framework for the identification, assessment and management of risk. The framework aimed at meeting customers' needs and maximizing shareholder value by aligning risk management with corporate strategy; assessing the impact of emerging risks from new technologies or markets; and developing risk tolerances and mitigating strategies.





Source: www.lloydstsb.com

Four concepts guided Lloyd's Enterprise Risk Management (ERM) activities – risk governance; empowerment; competitive advantage and common risk language.

Risk Governance

Lloyds TSB's risk governance structure aimed at creating a risk-aware culture. The company continued efforts to ensure that risks were well understood, and business decisions struck a balance between risk and reward in a manner that was consistent with the Group's risk appetite.

The Board was responsible for determining the long-term strategy of the business, the markets in which the Group would operate and the level of risk acceptable to the Group in each area of its business.

The Group Executive Committee was responsible to the Group Chief Executive for the formulation and implementation of strategy, operational plans, policies and budgets. It monitored operating and financial performance, assessed and controlled risk, and prioritised and allocated resources.





Source: www.lloydstsb.com

The Group Risk Committee was responsible to the Group Executive Committee for assessment and control of the high level risks assumed by the Group; approving the Group's high level policies; ensuring that the necessary culture, practices and systems were in place to meet internal and external obligations; and reviewing the allocation and deployment of capital at risk, taking into account the Group's risk appetite.

The Director of Group Risk Management was responsible for the implementation of risk policy and the provision of independent assurance to the Audit Committee and Board, who received regular reports on risk issues prepared by Group Risk Management. The Director of Group Risk Management reported to the Group Chief Executive and had access to the Chairman and members of senior management. He was also a member of the Group Risk Committee.

Empowerment

The directors of Lloyds TSB's business units had primary responsibility for measuring, monitoring and controlling risks within their areas of accountability. They established control frameworks for their businesses that were consistent with the group policies and within parameters set by Group Risk Management.

Competitive Advantage

Lloyds believed its ERM model had strengthened its ability to identify and assess risks; aggregate risks and define the corporate risk appetite; develop solutions for reducing or transferring risk, where appropriate; and exploit risks to generate competitive advantage.

Common Risk Language

Lloyds had adopted a risk terminology in which all risks were classified into 11 categories.

Figure 3: Lloyds - Common Risk Language

The Group has adopted a risk language in which all risks are classified by one or more of the following 11 Risk Drivers:



Source: www.lloydstsb.com

Governance, People and Organization

Lloyds TSB defined this risk as the possibility of loss due to poor corporate governance, wrong organization structure and inappropriate human resource policies. The Group's policy for managing Governance, People and Organisation risk was set out in the Group Policy Manual. The group had organized itself into three principal business units (UK Retail Banking and Mortgages, Wholesale and International Banking, and Insurance and Investments) with a centralized IT and operational support function (Group IT and Operations). These units were expected to be run in a manner consistent with strategic direction from the Board, tight financial and operating controls and prudent risk management. Lloyds TSB had picked up various industry best practices on corporate governance. The management emphasized the importance of conducting business with integrity, due skill, care and diligence.

The Board and senior management at both Group and business unit level received information regularly in line with business objectives to ensure that activities were appropriately controlled, key risks were identified and monitored, decisions were implemented and regulatory obligations met.

Group Audit independently reviewed adherence to the policies and processes that made up the control environment and disseminated best practices throughout the Group. The Group Audit Director met regularly with the Group Chief Executive and periodically with the Audit Committee. The Group sought to ensure that its employees acted with integrity. Employees were encouraged to alert management if they suspected misconduct, fraud or other serious malpractices.

Basel

The Capital Requirements Directive will come into force for all European banks at the start of 2007, although the final rules to be applied in the UK are only likely to be published in 2006. These will be subject to further consultation, and the Lloyds TSB Group has been playing a full part with the regulatory authorities in attempting to shape them. The Group aspires to an Internal Ratings Based approach to credit risk and an Advanced Measurement Approach to operational risk. Accordingly, a considerable investment is being made in order to meet the standards required for these more advanced approaches. As well as meeting the compliance imperative, benefits to the Group will accrue through further enhancement of our risk management and capital allocation capabilities.

Strategy Risk

This was defined as the possibility of failure to implement the agreed strategy. The Group emphasized maximizing value for its shareholders by being first choice for its customers, being a leader in its chosen markets and by tight cost control.

Lloyds TSB used the concept of Economic Profit to assess the creation of shareholder value. Economic Profit was defined as the profit attributable to shareholders, less a notional charge for the equity invested in the business.

The use of risk-based economic capital and regulatory capital was closely monitored at business unit and Group level. The Group's equity attribution model covered credit, market, insurance, business and operational risks.

The annual strategic planning process, conducted at Group and business unit level included a quantitative and qualitative assessment of the risks in the Group plan.

The Group's strategy and those of its constituent business units were reviewed and approved by the Board. Regular reports were provided to the Group Executive Committee and the Board on the progress of the group's key strategies and plans.

Revenue and capital investment decisions required additional formal assessment and approval. Formal risk assessment was conducted as part of the financial approval process.

Mergers and acquisitions required specific approval by the Board. In addition to the standard due diligence, Group Risk Management conducted an independent risk assessment of the target company and its proposed integration into the Group.

Change Management Risk

This was the risk of financial loss or reputational damage arising from programmes or projects failing to deliver as per expectations or because of failing to implement change effectively. Lloyd's had established change management standards to ensure a consistent approach across the group's project portfolio. The Group's approach to change management was also regularly benchmarked against other organizations around the world.

A specialist Group Project Services function provided a pool of experienced, professional project managers to be deployed on major projects across the Group. An Investment Committee oversaw the Group's investment in projects, and was constituted as a sub-committee of the Group Executive Committee. Changes that had a significant impact on customers or staff were managed as part of an overall Group Change Plan managed by the Change Implementation Review Committee (CIRC). The CIRC's brief was to ensure that the aggregate impact of the implementation of change on customers, staff and systems was understood, managed and controlled. A six-monthly update on the Group's Aggregate Change Plan was provided to the Board.

Product and Service Risk

This was the possibility of loss arising from the inherent characteristics, management or distribution of products or services, or from failure to meet customer expectations or cope with competitor offerings.

Product life cycles had to be effectively managed and new products developed to meet customer needs. Business units were responsible for maintaining a range of products, which met the needs of customers; managing and controlling product risks; and compliance with applicable regulations.

Business units were expected to have pricing objectives consistent with Group strategy. Business units' channel distribution strategy for products had to be consistent with the Group's distribution strategy. Business units were expected to ensure that proposed sales activity within delivery channels was compliant with regulatory requirements. All advertising and marketing material had to comply with the Group's governing policy on Business Conduct. Any statement of fact was substantiated through documentary evidence. Lloyds TSB had issued

directives that any comparison was presented in a fair and balanced way; and any reference to past performance had to be clearly stated. Business units were required, prior to the publication of any sales material, to seek confirmation that it complied with the regulatory and legal requirements of the jurisdiction in which the product was offered and marketed. Terms and conditions were approved by legal advisers and reviewed periodically.

Lloyds TSB defined a new product as a new or amended product that introduced a significantly different risk profile at group or business unit level. Business units provided Group Risk Management with details of new products at an early stage of product or service development to ensure compliance with the group's risk appetite and strategy.

Where appropriate, technical advice/approval was sought from specialist functions like Tax, Legal and Compliance. Only products carrying the approval of Group Risk Management and the business units involved in their manufacture/ delivery were offered to customers.

Business units established and monitored performance standards for all marketed products across a range of indicators, e.g., sales volumes, customer service, risk profile. Significant deviations from these standards were investigated and appropriate action taken.

Customer Treatment Risk

This was the risk of financial loss or reputational damage arising from inappropriate or poor customer treatment. Service improvements were monitored by customer satisfaction surveys. The results of the research were fed into the Group's CARE Index, which measured ongoing performance against five principal objectives: customer understanding; accessibility; responsibility; expertise; and overall service quality improvement. Trends across all the CARE Index categories were monitored and the data used to improve customer service. Lloyds also provided its staff with guidelines for compliance with regulations and processes for dealing with customer complaints.

Operational Risk

This was the possibility of loss resulting from inadequate or failed internal processes, people and systems, or from external events. For internal purposes, reputational impact was also included.

Business units were primarily responsible for identifying and managing their operational risks. They employed internal control techniques to reduce their likelihood or impact. Where appropriate, risk was mitigated by way of insurance. Group Risk Management's responsibilities in relation to operational risk included:

- Defining high-level operational risk policies to ensure a comprehensive and consistent approach to the identification and management of operational risk.
- Implementation of a Group-wide standard methodology to ensure consistency in operational risk management.
- Communication and provision of general guidance on operational risk related issues, including regulatory changes and developments, to promote best practice throughout the Group.
- Continuous review and improvement of various aspects of operational risk management to reflect industry best practices and regulatory requirements.
- Approval from a risk perspective of all new products launched throughout the Group, to ensure risks were understood by the business and managed appropriately.
- Identification of risk through formal risk reviews, covering specific risks, activities, business sectors or products, and encouraging pre-emptive action.

Legal and Regulatory Risk

Lloyds TSB faced the risk of loss or damage arising from failure to comply with the laws, regulations or codes applicable to the financial services industry.

Each Group business had a nominated individual with 'Compliance Oversight' responsibility under FSA rules. These individuals helped put in place within the business, a control structure which created awareness of the rules and regulations to which the Group was subject, and monitored and reported on adherence to these rules and regulations.

All compliance personnel also had a reporting line to Group Compliance, which set compliance standards across the Group and provided independent reporting and assessment to the Board and business unit directors.

Group Compliance included a dedicated unit, led by the Group Financial Crime Director. The unit was responsible for ensuring that effective processes were in place to identify and report on suspicious transactions and customers in support of the worldwide fight against financial crime.

The Group Compliance Director had access to the Chairman, Group Chief Executive and members of senior management.

Credit Risk

Essentially, this was as the possibility of loss arising from counterparty default. All business units were required to operate an authorized rating system that complied with the Group's standard methodology. The Group used a 'Master Scale' rating structure with ratings corresponding to the probability of future default. Group businesses identified and defined portfolios of credit and related risk exposures and the key benchmarks, behaviors and characteristics by which those portfolios were managed. Regular portfolio monitoring reports were produced for review by Group Risk Management. Various tools were used to control the Group's exposure to undue levels of credit risk:

Counterparty Limits: Exposure to individual counterparties, groups of counterparties or customer risk segments were controlled through a tiered hierarchy of delegated sanctioning authorities. Approval requirements were based on the transaction amount, the customer's aggregate facilities, credit risk ratings and the nature and term of the risk. Regular reports on significant credit exposures were provided to the Group Executive Committee and Board.

Bank Exposures: An in-house proprietary rating system was used to approve bank facilities, which were sanctioned on a Group-wide basis.

Cross-border Exposures: Country limits were authorized and managed by a dedicated unit, using an in-house rating system, which took into account economic and political factors.

Concentration Risk: Group Risk Management set sector caps that reflected risk appetite, and monitored exposures to prevent excessive concentration of risk.

Credit Derivatives: Credit derivatives included credit swaps, credit spread options and credit-linked notes. Lloyds TSB believed it had limited exposure to such instruments.

Group Risk Management monitored credit risk with the help of the following:

- Formulation of high-level credit policies designed to facilitate identification and mitigation of credit risk.
- Provision of lending guidelines that defined the responsibilities of lending officers and attempted to bring discipline and focus into credit decisions.
- Establishment and maintenance of the Group's Large Exposure and Provisioning policies, in accordance with regulatory reporting requirements.

- Monitoring of scorecards. The Group utilized statistical decision techniques (primarily credit scoring and performance scoring) for its principal consumer lending portfolios. Group Risk Management monitored material changes to scorecards on a regular basis.
- Maintenance of a facilities database. A centralized database of large corporate, sovereign and bank facilities attempted to ensure that a consistent aggregation policy was maintained throughout the Group.
- Monitoring and controlling residual value risk exposure. The Group's appetite for such exposure was communicated to the business units by a series of time referenced sector caps, ensuring an acceptable distribution of future risk.
- Communication and provision of general guidance on all credit-related risk issues, including regulatory changes and environmental risk policy, to promote consistent and best practice throughout the Group.

Day-to-day credit management and asset quality within each business unit was the primary responsibility of the relevant business unit director. Each business unit had in place established credit processes, which were consistent with the corresponding Group policies. Authority to delegate lending authorities lay within business units. Specialist units within Group businesses were expected to take care of: intensive management and control; security perfection, maintenance and retention; expertise in documentation for lending and associated products; sector specific expertise; and legal services applicable to the particular market place and product range offered by the business unit.

Market Risk

Loss could arise from unexpected changes in financial prices, including interest rates, exchange rates, bond, equity and commodity prices. The Group's banking activities exposed it to the risk of adverse movements in interest rates or exchange rates. The Group's insurance activities also exposed it to market risk. Lloyds believed it had little or no exposure to equity or commodity risk.

Various techniques were used to quantify market risk. These reflected the nature of the business activity, and included simple interest rate gapping², open exchange positions, sensitivity analysis and Value at Risk (VAR). Stress testing and scenario analysis were also used sometimes to simulate extreme conditions to supplement these core measures.

Market risk within the group's trading portfolios was calculated using various parameters. During 2004, based on a 99 percent confidence level, assuming positions were held overnight and laying greater emphasis on more recent data, the VAR on the Group's global trading averaged £1.3 million (2003: £1.50 million) with a maximum of £2.0 million (2003: £2.60 million) and a minimum of £0.80 million (2003: £0.90 million). The figure as on 31 December 2004 was £0.9 million (2003: £1.00 million).

Interest rate risk within the group's non-trading exposure was summarized in the form of an interest rate-repricing table. Items were allocated to time bands by reference to the earlier of the next contractual interest rate repricing date and the maturity date. However, the table did not take into account the effect of interest rate options used by the Group to hedge its exposure.

Structural Foreign Exchange Risk – This arose from the Group's investments in its overseas operations. The structural position was managed after considering the currency composition of the group's risk-weighted assets. Lloyds TSB estimated that an increase of 10 percent in the value of sterling against all other currencies would lead to a £82 million reduction in reserves. There would be no material impact on the Group's risk asset ratio.

² Multiplying the difference between interest sensitive assets and liabilities by the change in interest rate.

Limits to control market risk in respect of trading positions, UK wholesale banking and overseas centers were set by Group Risk Management up to a total authorized by the Board. A combination of position and sensitivity limits was used, depending on the nature of the business activity.

Limits to control interest rate risk within the group's UK retail portfolios were set out in the policy for Group Balance Sheet Management (GBSM), which was established by the Group Asset and Liability Committee (ALCO) and ratified by the Board. The policy aimed at optimizing the stability of future net interest income through hedging transactions using interest rate swaps and other financial instruments. Both short and long-term interest rate parameters were applied to management of the balance sheet. Overseas operations were managed within limits authorized by Group Risk Management. Some centers had also adopted benchmark profiles for investment of interest rate sensitive liabilities as approved by Group Risk Management.

Market risk in the wholesale banking books was managed in the UK by Lloyds TSB Treasury, and internationally by an authorized local treasury operation in each overseas center. The levels of exposure within these books were controlled and monitored within approved limits, both locally and also centrally by Group Risk Management. Active management of the book was necessary to meet customer requirements in a changing market.

Trading was restricted to specialist centers, authorized by Group Risk Management. The most important center was the Group's principal Treasury department in London. The level of exposure was controlled and monitored within approved limits, locally and centrally, by Group Risk Management. Most of the group's trading activity was undertaken to meet the requirements of customers for foreign exchange and interest rate products. However, some interest rate and exchange rate positions were taken using derivatives and on-balance sheet instruments, with the objective of earning a profit from favourable movements in market rates. Accordingly, these transactions were reflected in the accounts at their fair value and gains and losses shown in the profit and loss account as dealing profits.

Market risk in the group's retail portfolios, including mortgages, and in the Group's capital funds arose from the different repricing characteristics of the group's banking assets and liabilities and was managed by GBSM, which in turn reported to the ALCO. The simulation models used by GBSM made assumptions about the relationships between customer behaviour and the level of interest rates and the anticipated level of future business. The accuracy of these assumptions affected the efficiency of hedging transactions. The assumptions were regularly updated and the projected exposure was actively managed in accordance with the policy.

Derivatives were used to meet customers' financial needs; as part of the group's trading activities; and to reduce the group's own exposure to fluctuations in interest and exchange rates. Lloyds TSB assessed the liquidity of the markets and products in which the group traded to ensure that there were no undue concentrations of activity and risk.

Insurance Risk

Lloyds TSB defined this risk as the possibility of loss arising from the sensitivity of profits to movements in claims experience and expectation; movements in the market value of invested assets which were not matched by similar movements in the value of liabilities; the presence of options and guarantees in insurance products; and changes in the legal, regulatory and fiscal environment.

Insurance risks were both retained and reinsured with external underwriters. The retained risk level was carefully controlled and monitored, with close attention being paid to the analysis of underwriting experience, product design, policy wordings, adequacy of reserves, solvency management and regulatory requirements.

General insurance exposure to accumulations of risk and possible catastrophes was mitigated by reinsurance arrangements which were spread over different reinsurers. Detailed modeling, including that of the Probable Maximum Loss under various catastrophe scenarios, supported the choice of reinsurance arrangements. Appropriate reinsurance arrangements were also used within the life and pensions businesses.

Investment strategy was determined by the term and nature of the underwriting liabilities. Asset/liability matching positions were actively monitored. Investment strategy for surplus assets held in excess of liabilities took into account the regulatory and internal business requirements for capital to be held to support the business.

Equity derivatives were used by the group to match equivalent liabilities arising from some retail products. Derivatives were also used in portfolio management in client funds in some cases.

With-profits life and pensions business involved guaranteed benefits that created a contingent market risk to the Group. Accordingly, in extreme investment market conditions, the surplus assets in the life and pensions business were used to support with-profits benefits. Options and guarantees were incorporated in new insurance products only after a careful consideration of the risks involved.

Financial Risk

The international standard for measuring capital adequacy was the risk asset ratio, which related to on- and off-balance sheet exposures weighted according to broad categories of risk. The Group's capital ratios, calculated in line with the requirements of the Financial Services Authority (FSA) were a key factor in the group's budgeting and planning processes. Updates of expected ratios were prepared regularly during the year. Capital raised took into account expected growth and currency of risk assets, and also allowed for the sensitivity of the group's capital to movements in equity markets.

Each reporting entity within the group had a finance function, which was responsible for the generation of financial, management and regulatory information. It was the responsibility of Group Finance to produce consolidated information for use internally and to meet external regulatory and statutory reporting requirements.

Lloyds TSB had put in place a policy for measuring liquidity across the group. A liquidity ratio was calculated by taking the sum of liquid assets, five-day wholesale inflows and back-up lines, and then dividing this by the sum of five-day wholesale outflows and a percentage of retail maturities and contingent claims drawable over the next five days.

The group and its regulated subsidiary banks had been allocated an Individual Capital Ratio by the FSA. The board maintained a formal buffer in addition to the Individual Capital Ratio. Actual or prospective breaches of the formal buffer had to be notified to the FSA, together with proposed remedial action. Informally, an additional buffer was maintained. In addition, the Board had set a maximum limit for the proportion of debt instruments in the capital base. Risk-weighted assets were monitored by business units, while capital was controlled centrally.

The Liquidity Policy required all authorized local treasury operations to maintain a liquidity ratio of over 100 percent, besides ensuring compliance with local regulatory requirements. It was the responsibility of the local line management to ensure that the liquidity policy was implemented satisfactorily. Compliance was monitored by regular liquidity returns to Group Risk Management.

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Amounts in £millions	2004	2003	2002	2001	2000
Profit and Loss account					
Net interest income	4,920	5,255	5,171	4,922	4,587
Other finance income	39	34	165	307	424
Other income	4,608	4,619	3,551	3,659	3,760
Trading surplus	4,650	4,735	3,974	4,119	4,503
Provisions for bad and doubtful debts	(866)	(950)	(1,029)	(747)	(541)
Profit on ordinary activities before tax	3,493	4,348	2,618	3,167	3,791
Profit on ordinary activities after tax	2,489	3,323	1,852	2,290	2,707
Profit for the year attributable to shareholders	2,421	3,254	1,790	2,233	2,658
Dividends	1,914	1,911	1,908	1,872	1,683

Exhibit I Lloyds: Financial Highlights

Source: Lloyds TSB Annual Report, 2004.

Exhibit II

	0004		0000	0004	2000
Balance sheet data at 31 December (£m)	2004	2003	2002	2001	2000
Called-up share capital	1,419	1,418	1,416	1,411	1,396
Shareholders' funds (equity and non-equity)	9,977	9,624	7,943	10,326	11,877
Customer accounts	122,062	116,496	116,334	109,116	101,989
Undated subordinated loan capital	5,852	5,959	5,496	4,102	3,391
Dated subordinated loan capital	4,400	4,495	4,672	4,006	4,119
Loans and advances to customers	154,240	135,251	134,474	122,935	14,432
Assets ¹	225,079	201,934	207,343	189,317	169,495
Total assets	279,843	252,012	252,561	235,501	220,383
Share information ¹					
Basic earnings per ordinary share	43.3p	58.3p	32.1p	40.4p	48.4p
Diluted earnings per ordinary share	43.0p	58.1p	32.0p	40.0p	47.9p
Net asset value per ordinary share	176p	170p	140p	183p	213p
Dividends per ordinary share	4.2p	34.2p	34.2p	33.7p	30.6p
Market price (year-end)	473p	448p	446p	746p	708p
Number of shareholders (thousands)	953	974	973	981	1,026
Number of ordinary shares in issue (millions) ²	5,596	5,594	5,583	5,564	5,507
Financial ratios (%) ³					
Dividend payout ratio	79.1	58.7	106.6	83.8	63.3
Post-tax return on average shareholders' equity	24.3	38.5	16.8	18.1	21.2
Post-tax return on average assets	1.17	1.57	0.93	1.28	1.68
Post-tax return on average risk-weighted assets	2.01	2.63	1.62	2.26	3.08
Average shareholders' equity to average assets	4.7	4.0	5.4	6.9	7.8
Cost:income ratio	51.4	52.2	55.3	53.7	48.7
Capital ratios (%)					
Total capital	100	11.3	9.6	8.8	8.6
Tier 1 capital	8.9	9.5	7.7	7.7	7.9

Lioyus: Dalance Sheet and Capital Kat	Lloyds: B	s: Balance	Sheet	and	Capital	Ratio
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1 Assets exclude long-term assurance assets attributable to policy holders.

2 Averages are calculated on a monthly basis from the consolidated financial data of Lloyds tsb group.

3 This figure exclude 79 million limited voting ordinary shares.

Source: Lloyds TSB Annual Report, 2004.

	UK Retail Banking	General Insurance	Life Pensions Unit Trusts and Asset Management	Insurance and Investments	Wholesale and International Banking	Central Group Items	Continued Operations	Discontinued Operations	Total
Year ended 31 December 2004	£m	£m	£m	£m	£m	£m	£m	£m	£m
Net interest income	3,198	44	55	99	1,966	(343)	4,920	-	4,920
Other finance income	-	-	-	-	-	39	39	-	39
Other operating income	1,639	497	818	1,315	1,641	13	4,608	-	4,608
Total income	4,837	541	873	1,414	3,607	(291)	9,567	-	9,567
Operating expenses	(2,513)	(149)	(123)	(272)	(2,090)	(42)	(4,917)	-	(4,917)
I rading surplus (deficit)	2,324	392	750	1,142	1,517	(333)	4,650	-	4,650
General insurance claims	-	(224)	-	(224)	-	-	(224)	-	(224)
Debts	(673)	-	-	-	(193)	-	(866)	-	(866)
Amounts written off fixed asset	-	-	-	-	(52)	-	(52)	-	(52)
investments					(.				<i></i>
Loss on sale of businesses	-	_	-	-	(15)	-	(15)	-	(15)
Profit (loss) before tax	1,651	168	750	918	1,257	(333)	3,493	-	3,493
Year ended 31 December, 2003*									
Net interest income	3,137	38	43	81	1,875	(349)	4,744	511	5,255
Other finance income	-	-	-	-	-	34	34	-	34
Other operating income	1,533	505	579	1,084	1,561	299	4,477	142	4,619
	4,6/0	543	622	1,165	3,436	(16)	9,255	(070)	9,908
Trading expenses	(2,503)	(141)	(120)	(201)	(2,048)	(9)	(4,901)	(272)	(0,173)
Caparal insurance alaima	2,087	40Z	502	904	1,300	(25)	4,304	301	4,735
Beneral insurance claims	(504)	(230)	-	(230)	(306)	12	(230)	(63)	(230)
debts	(594)	-	-	-	(300)	15	(007)	(03)	(950)
Amounts written off fixed asset investments	-	-	-	-	(44)	-	(44)	-	(44)
Share of results of joint ventures	(22)	-	-	-	-	-	(22)	-	(22)
	-	-	-	-	-	-	-	865	865
	1,471	166	502	668	1,038	(12)	3,165	1,183	4,348
Geographical area:**	Domestic 2004	International 2004	Total 2004	Domestic 2003	International 2003	Continuing operations 2003	Discontinued operations § 2003	Total	
	£m	£m	£m	£m	£m	£m	£m	£m	
Interest receivable	9,992	403	10,395	8,490	383	8,873	1,276	10,149	
Other finance income	39	-	39	34	-	34	_	34	
Fees and commissions receivable	2,980	144	3,124	2,831	156	2,987	112	3,099	
Dealing profits (before exps.)	249	22	271	276	249	525	35	560	
Income from long-term assurance	715	-	715	436	-	436	17	453	
business									
Genrl. insurance prem.income	554	-	554	535	-	535	-	535	
Other operating income	682	6	688	677	5	682	12	694	
Total Gross income	15,211	575	15,786	13,279	793	14,072	1,452	15,524	
Profit on ordinary activities before	3,295	198	3,493	2,810	355	3,165	1,183	4,348	
(ax	Not Acceto	Not	Annatatt	Acceto					
Segmental analysis (continued)	2004	Assets ⁺ 2003	2004	2003					
	£m	£m	£m	£m					
Class of business UK Retail Banking	2,991	2,555	101,615	90,541					
Insurance and Investments									
General insurance	427	470	1.084	1.009					
Life, pensions, unit trusts and	6,908	6,531	9,141	8,835					
asset management	7 335	7 001	10 225	0.844					
Wholesale and International	4,469	4,390	112,969	101,286					
Banking Central group items	(1 770)	(1 070)	074	000					
Central group items	(4,112) 10.000	(4,278) 0 660	2/1	203					
Geographical area**	10,023	9,000	223,079	201,934					
Domestic	0 360	0 060	212 107	180 162					
International	654	5009	12 882	12 772					
	10,023	9,668	225,079	201,934					

Exhibit III Lloyds: Business Segment Highlight

From the beginning of 2004 the Group changed its UK branch and other distribution networks from cost centers to profit centers and, consequently, amended the internal commission arrangements between these networks and the insurance product manufacturing businesses with in the Group. The effect of this change has been to redistribute income from the insurance segments to UK Retail Banking and, to a lesser extent, to Wholesale. In addition, certain costs previously included in Central group items were reallocated to the operating segments. The 2003 segmental analysis has been restated to reflect these changes on a consistent basis.

** The geographical distribution of gross income sources, profit on ordinary activities before tax and assets by domestic and international operations is based on the location of the office recording the transaction, except for lending by the international business booked in London. Net assets represent shareholders' funds plus equity minority interests. Disclosure of information on net assets is an accounting standard requirement (SSAP 25): it

+ is not appropriate to relate it directly to the segmental profits above because the business is not managed by the allocation of net assets to business units.

++ Assets exclude long-term assurance assets attributable to policyholders.

§ Discounted operations related to the Wholesale and International Banking segment.

Source: Lloyds TSB Annual Report, 2004.

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	2004	Continuing	Discontinued	Total
	£ million	Operations	Operations	2003
		2003	2003	
		£ million	£ million	
Interest receivable:				
Interest receivable and similar income	423	389	63	452
arising from debt securities				
Other interest receivable and similar	9,972	8,484	1,213	9,697
income				
Interest payable	5,475	4,129	765	4,894
Net interest income	4,920	4,744	511	5,255
Other finance income	45	39	34	-
Other income				
Fees and commissions receivable	3,124	2,987	112	3,099
Fees and commissions payable	(744)	(688)	(34)	(722)
Dealing profits (before expenses)	271	525	35	560
Income from long-term assurance	715	436	17	453
husiness	/15	450	17	-55
General insurance premium income	554	535		535
Other operating income	688	682	12	694
Other operating income	4 608	4 477	142	4 610
	4,008	4,477	652	4,019
	9,307	9,255	033	9,908
Operating expenses	1.001	1.000	0.47	1.176
Administrative expenses	4,284	4,229	247	4,476
Depreciation and amortization	633	672	25	697
Total operating expenses	4,917	4,901	272	5,173
Trading surplus	4,650	4,354	381	4,735
General insurance claims	224	236	—	236
Provisions for bad and doubtful debts				
Specific	953	883	63	946
General	(87)	4	—	4
	866	887	63	950
Amounts written off fixed asset	52	44	_	44
investments				
Operating profit	3,508	3,187	318	3,505
Share of results of joint ventures	-	(22)	—	(22)
(Loss) profit on sale of businesses	(15)	_	865	865
Profit on ordinary activities before tax	3,493	3,165	1,183	4,348
Tax on profit on ordinary activities	1,004			1,025
Profit on ordinary activities after tax	2,489	3,323		
Minority interests:				
Equity	26	22		
Non-equity	42	47		
Profit for the year attributable to	2.421	3.254		
shareholders	_,1	2,201		
Dividends	1.914	1.911		
Profit for the year	507	1.343		
Earnings per share	43 3n	58 3n		
Diluted earnings per share	43.0p	58.1p		
Enable cumings per share	TJ.00	50.1p		

Exhibit IV Llyods: Consolidated Profit and Loss Account

Source: Lloyds TSB Annual Report, 2004.

	2004	2002
at 31 December	2004	2003
	£ million	£ million
Liabilities		
Deposits by banks	39,738	23,955
Customer accounts	1,22,062	1,16,496
Items in course of transmission to banks	631	26
Debt securities in issue	27 217	25 922
Other liabilities	6 6 1 0	7 007
A second and a formed in second	0,019	7,007
Accruais and deferred income	3,800	3,206
Post-retirement benefit liability	2,231	2,139
Provisions for liabilities and charges:		
Deferred tax	1,473	1,376
Other provisions for liabilities and charges	417	402
Subordinated liabilities:		
Undated loan capital	5.852	5,959
Dated loan capital	4 400	4 495
Dated toall capital	10 252	10.454
	10,232	10,434
Minority interests:		
Equity	46	44
Non-equity	550	683
	596	727
Called-up share capital	1.419	1.418
Share premium account	1 145	1 136
Merger reserve	3/3	3/3
Drofit and loss account	7 070	6 707
Profit and loss account	7,070	0,727
Snareholders funds (equity and non-equity)	9,977	9,624
	225,079	201,934
Long-term assurance liabilities to policyholders	54,764	50,078
Total liabilities	279,843	252,012
Memorandum items		
Contingent liabilities:		
Acceptances and endorsements	71	299
Guarantees and assets pledged as collateral security	6 786	6 1 2 2
Other contingent lightlities	1,660	2,604
Other contingent natinities	1,009	2,004
	8,526	9,025
Commitments	85,290	79,335
Fixed assets Investments:		
Shares in group undertakings	11,080	10,753
Loans to group undertakings	1,723	1,723
	12,803	12,476
Current assets	,	,
Debtors falling due within one year:		
A mounts awad by group undertakings	1 200	1 297
Allounts owed by group undertakings	1,390	1,307
Other debtors	97	88
Cash balances with group undertakings	208	362
	1,695	1,837
Current liabilities		
Amounts falling due within one year:		
Amounts owed to group undertakings	1.741	1.913
Other creditors	107	106
Dividend payable	1 215	1 214
Dividenti payaote	1,010	1,314
NT	3,103	3,333
Net current liabilities	(1,468)	(1,496)
Total assets less current liabilities	11,335	10,980
Creditors		

Exhibit V Lloyds: Consolidated Balance Sheet

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Enterprise-wide Risk Management in Banks

at 31 December	2004	2003
	£ million	£ million
Amounts falling due after more than one year:		
Loan capital	1,358	1,356
Net assets	9,977	9,624
Capital and reserves		
Called-up share capital	1,419	1,418
Share premium account	1,145	1,136
Revaluation reserve	5,014	4,687
Profit and loss account	2,399	2,383
Shareholders' funds (equity and non-equity)	9,977	9,624

Source: Lloyds TSB Annual Report, 2004.



Source:http://finance.yahoo.com

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Appendix II

Enterprise Risk Management at Royal Bank of Canada

Introduction

RBC (Royal Bank of Canada) a leading Canadian bank belonging to the RBC Financial Group had five business segments: RBC Banking, RBC Insurance, RBC Investments, RBC Capital Markets and RBC Global Services. RBC Banking offered services such as deposit accounts, investments, mutual funds, financial planning, credit and debit cards, loans and residential and commercial mortgages. RBC Insurance provided creditor, life, health, travel, home, auto and reinsurance products and services. RBC Investments offered full-service and self-directed brokerage, financial planning, investment counseling, personal trust, private banking and investment management products and services. RBC Capital Markets provided wholesale financial services to large corporate, government and institutional clients. RBC Global Services offered specialized transaction processing services to business, commercial, corporate and institutional clients in domestic and select international markets. In 2002, RBC generated total revenues of C\$ 15,770 million and a net income of C\$ 2898 million.

Besides its more than 1,100 domestic locations, RBC had about 100 offices in the Caribbean and some two dozen additional countries. Its US operations included brokerage firm RBC Dain Rauscher and RBC Centura Banks, which operated some 250 branches in the Southeast. RBC had been attempting to increase its presence outside Canada, particularly in the US, where it also owned Chicago-based mortgage lender RBC Mortgage and South Carolina-based Liberty Life Insurance. RBC Centura Banks gave RBC Financial a presence in the technology-rich Research Triangle Park area in North Carolina. RBC had also bought Atlanta-area bank, Eagle Bancorp.

Overview of Risks

RBC had identified the following priorities for its risk management function:

- Enhancing communication on risk and risk appetite throughout the organization.
- Aligning the risk management function with the business segments.
- Investing in capabilities to measure, understand and manage risk better.
- Strengthening the efficiency, accessibility and responsiveness of key risk processes and practices.
- Attracting, developing and retaining a team of highly performing professionals.

RBC used the risk pyramid as the primary tool to identify and assess risk across the organization. The pyramid provided a common language for evaluating risk in business reviews, new businesses, new products, new initiatives, acquisitions or alliances. RBC believed the following risks were important.

- Credit Risk Market Risk
- Liquidity Risk
- Insurance Risk
- Operational Risk.



Source: RBC Annual Report, 2002.

Organizational Structure THE BOARD OF DIRECTORS AND GROUP RISK COMMITTEE

The top level of the risk pyramid comprised the Board of Directors, the Conduct Review and Risk Policy Committee and Group Risk Committee. The key responsibilities at this level were to:

- Shape, influence and communicate the organization's risk culture.
- Determine and communicate the organization's risk appetite.
- Define the organizational structure for Group Risk Management.
- Review and approve policies for controlling risk.
- Review and monitor the major risks being assumed by the organization and providing direction as required.
- Ensure there were sufficient and appropriate risk management resources across the organization against the risks being taken.

The middle level of the risk pyramid comprised the Chief Risk Officer, Group Risk Management and the various Risk Committees. The Risk Committees included the Asset/Liability Committee, US Corporate Governance Committee, the Ethics and Compliance Committee, Risk Management Committee and other committees responsible for areas such as interest rate risk and trading risk.







Source: RBC Annual Report, 2002.

Key responsibilities were to:

- Implement and maintain an integrated enterprise-wide risk measurement, management and reporting framework.
- Establish a comprehensive risk assessment and approval process including enterprise-wide policies and procedures.
- Establish guidelines and risk limits to ensure appropriate risk diversification and optimization of risk-return on both a portfolio and transactional basis.
- Advise the board and executive management about major risks facing the bank.
- Partner with the business segments in identifying, understanding, measuring, mitigating and monitoring the risks being taken.

RBC communicated its policies and procedures, throughout the organization to guide the day-to-day management of credit risk exposure. RBC attempted to reduce exposure to non-core corporate client relationships while increasing the size of the consumer portfolio, including residential mortgages, which had very low loss rates.

Corporate borrowers were assigned an internal risk rating based on a detailed examination of the organization. This examination considered industry sector trends, market competitiveness, overall company strategy, financial strength, access to funds, financial management and any other risks facing the organization. RBC's rating system was based on a 22-point scale.

RBC used credit-scoring models to determine a credit score for consumers and some small business lending transactions. The credit score measured the relative risk of the initial extension of credit and any further increases. Consumer credit risk was monitored using statistical scoring models and payment history in order to predict portfolio behavior. The internal risk ratings and credit scores were assessed and updated on a regular basis. Portfolio diversification was an overriding principle, behind RBC's credit policies. RBC maintained limits to ensure it was not overexposed to any given client, industry sector or geographic area. To avoid excessive losses due to counterparty defaults, RBC established single name limits that were set according to risk ratings. In certain cases, loans were syndicated in order to reduce overall exposure to a single name.

Limits were also in place to manage exposure to any particular country or sector. Each country and sector was assigned a risk rating. This risk rating considered factors common to all entities in a given country or sector, but which were outside the control of any individual entity. Limits were determined, based on the risk rating along with overall risk appetite and business strategy.

As on October 31, 2002, credit mitigation was in place to cover \$1.0 billion in corporate credit exposure. RBC also provided protection through credit derivatives to various counterparties totaling C\$ 0.3 billion as at October 31, 2002. RBC also sought to identify and sell loans it made to borrowers whose risk and reward profile and borrower ratings were no longer desirable.

Liquidity Risk

RBC aimed at generating or obtaining sufficient cash or its equivalents on a timely and cost-effective basis to meet commitments as they fell due. RBC believed the management of liquidity risk was crucial to maintaining market confidence and ensuring that profitable business opportunities could be exploited. RBC believed it had a comprehensive liquidity management framework comprising policies, procedures, methodologies and measurements.

The Group Risk Committee and the Asset/Liability Committee provided guidance and oversight to the liquidity risk management program. The Audit Committee of the board approved its liquidity management framework and significant related policies. Corporate Treasury had global responsibility for developing liquidity management policies, strategies and contingency plans and for recommending and monitoring limits and coordinating subsidiary activities.

RBC's Liquidity Crisis Team was responsible for the development, maintenance and success of the liquidity contingency plan. This plan was activated in the event of a general market disruption or adverse economic developments that made it difficult to meet obligations. This team met regularly to review potential crisis scenarios and to update related action plans. Contingent liquidity exposures were identified and provisions were made to minimize possible damage by keeping a pool of unencumbered, high-quality assets. These assets were marketable and could be immediately sold or pledged for secured borrowing and represented a dedicated and reliable source of emergency funding.

Structural Liquidity Risk Management

Existing balance sheet composition could create liquidity exposure due to mismatches in effective maturities between assets and liabilities. Structural liquidity risk management addressed this type of exposure, which was measured and monitored through ongoing stress testing of the balance sheet.

Tactical Liquidity Risk Management

Tactical liquidity risk management addressed the normal day-to-day funding requirements. RBC imposed limits on net funds outflows for specified periods, particularly for key short-term time horizons. Scenario analysis was performed periodically on the assumed behaviour of cash flows under varying conditions to assess funding requirements and, as required, to update assumptions and limits. Detailed reports on principal short-term asset/liability mismatches were monitored on a daily basis to ensure compliance with the prudential limits established for overall group exposure and by major currency and geographic location. Corporate Treasury issued directives to the individual units engaged in executing policy to ensure consistent application of cash flow management principles across the entire organization.

Contingent Liquidity

The liquidity contingency plan identified comprehensive action plans that would be implemented in the event of general market disruptions or adverse economic developments. Four different market scenarios, of varying duration and severity, were addressed in the liquidity contingency plan to understand potential liquidity exposures and requisite responses. The Liquidity Crisis Team, met regularly to review and update implementation plans and to consider the need for activation in view of developments in the domestic and global business environment

				J			
					Weighted	Risk-adjust	ed Balance
		F	Balance Sheet Amount		Average of Risk Weights (2)	2002	2001
Balance sheet assets							
Cash resources			\$ 21,3	323	11%	\$ 2,284	\$ 1,515
Securities							
Issued or guaranteed by Canadian or other OECD governments			27,7	/12	0%	36	_
Other			66,0)88	11%	7,137	7,341
Residential mortgages (3)							
Insured		33,849		1%	379	383	
Conventional		38,950		52%	20,168	18,511	
Other loans and acceptances (23)						
Issued or guaranteed by Canac other OECD governments	Issued or guaranteed by Canadian or other OECD governments		18,448		17%	3,098	1,810
Other		121,893		74%	89,836	97,553	
Other assets		48,693		12%	5,692	6,114	
			\$ 376,956			\$ 128,630	\$ 133,227
	Contra Amou	.ct nt	Credit Conversion	Credit Equivalent Amount			
Off-balance sheet financial Instruments Credit Instruments Guarantees and standby letters of credit							
Financial	\$ 10,3	393	100%	\$ 10,393	82%	\$ 8,560	\$ 8,629
Non-financial	3,2	217	50%	1,609	100%	1,609	1,422

Exhibit I RBC: Risk-Adjusted Assets

Enterprise-wide Risk Management in Banks

Documentary and commercial letters of credit	772	20%	154	97%	150	148
Securities lending	23,967	100%	23,967	3%	646	393
Commitments to extend credit						
Original term to maturity of 1 year or less	40,931	0%	-	-	-	-
Original term to maturity of more than 1 year	34,115	50%	17,058	92%	15,638	18,821
Uncommitted amounts	45,978	0%	-	-	-	-
Note issuance/revolving underwriting facilities	23	50%	12	100%	12	66
	\$ 159,396		\$ 53,193		\$ 26,615	\$ 29,479

				Weighted Risk-adjusted Balance			
	Balar	nce Sheet An	nount	Average of Risk Weights (2)	2002	2001	
	Contract Amount	Credit Conversion	Credit Equivalent Amount				
	National Amount	Gross Positive Replacement Cost (4)	Credit Equivalent Amount (5)				
Derivatives (6)							
Interest rate contracts							
Forward rate agreements	\$ 198,845	\$ 178	\$ 299	21%	\$ 64	\$ 114	
Swaps	862,264	19,608	24,357	26%	6,323	5,617	
Options purchased	55,293	563	914	28%	258	123	
	1,116,402	20,349	25,570		6,645	5,854	
Foreign exchange contracts							
Forward contracts	544,719	6,802	13,049	28%	3,685	3,881	
Swaps	84,055	1,781	6,341	23%	1,445	1,261	
Options purchased	56,204	809	1,491	29%	439	441	
	684,978	9,392	20,881		5,569	5,583	
Credit derivatives (7)	52,151	861	2,963	29%	858	369	
Other contracts (8)	13,126	849	1,701	31%	529	617	
Total derivatives before netting	\$1,866,657	31,451	51,115		13,601	12,423	
Impact of master netting agreements		(20,861)	(26,930)		(7,132)	(6,339)	
Total derivatives after netting		\$ 10,590	24,185		6,469	6,084	
Total off-balance sheet financial instruments			\$ 77,378		\$33,084	\$35,553	
General market risk					3,845	2,257	
Total risk-adjusted assets					\$165,559	\$171,047	

- Using guidelines issued by the Superintendent of Financial Institutions, Canada and Canadian GAAP financial information.
- 2 Represents the weighted average of counter party risk weights within a particular category.
- 3 Amounts are shown net of allowance for loan losses.

4 Represents the total current replacement value of all outstanding contracts in a gain position, before factoring in the impact of master netting agreements. Exchange-traded instruments are subject to daily margin requirements. Such instruments are excluded from the calculation of risk adjusted assets as they are deemed to have no additional credit risk. The fair value of \$194 million (2001 - \$1, 693 million) is excluded at October 31, 2002. Written options are excluded as they represent out obligations and as such do not attract credit risk.

- 5 Consists of (i) the total positive replacement value of all outstanding contracts, and (ii) an amount for potential future credit exposure.
- 6 The national amount of \$5,593 million (2001-\$1,693 million) and replacement cost of \$93 million (2001 \$49 million) of derivatives embedded in financial instruments, certain warrants and loan commitments considered as derivatives are enclosed from the amounts in this table.
- 7 Comprises default swaps, total return swaps and credit default bassiets.

8 Comprises precious metals, commodity and equity linked derivative contracts.

Source: RBC Annual Report 2002.

Operational Risk

Operational risk is the risk of direct or indirect loss resulting from inadequate or failed technology, human performance, processes or external events. RBC endeavored to minimize such risks by ensuring that effective infrastructure, controls, systems, and individuals were in place throughout the organization.

RBC had developed two new processes aimed at monitoring and mitigating operational risks in the organization.

Risk and Control Self-Assessment (RCSA)

RCSA was a formal process of proactively identifying, documenting, assessing and managing operational risks. Each business segment and functional unit was divided into its component activities, which became entities to be assessed. Each entity completed a workshop-based, self-assessment to determine its key risks, mitigate controls and assess the potential impact and likelihood of a problem occurring and the acceptability of the residual risk after existing controls were considered.

Where residual risk was deemed unacceptable, the group agreed on an action plan and timeline. The findings of the various RCSAs conducted were documented, aggregated, analyzed and reported on a group-wide basis.

Loss Event Database (LED)

LED referred to a centralized database aimed at capturing information about operational losses. The losses tracked were mapped to the entities identified in the RCSA process. Information such as the frequency, severity and nature of operational losses was captured. RBC believed this allowed analysis at both business segment and enterprise levels leading to a better understanding of the root causes of operational losses.

Capital Management

RBC believed capital management required balancing the desire to maintain strong capital ratios and high debt ratings with the need to provide competitive returns to shareholders. RBC considered expected levels of risk-adjusted assets and balance sheet assets, future investment plans and the costs and terms of current and potential capital issues while managing capital.

RBC believed in maintaining strong capital ratios through internal capital generation, the issuance of capital instruments when appropriate, and controlled growth in risk-adjusted assets.

Capital levels for Canadian banks were regulated pursuant to guidelines issued by OSFI², based on standards issued by the Bank for International Settlements (BIS). Regulatory capital was divided into two tiers. Tier I capital comprised the more permanent components of capital. RBC's policy was to remain well capitalized so as to provide a safety net for the variety of risks to which it was exposed. In 1999, OSFI formally established risk-based capital targets for deposit-taking institutions in Canada. These targets were: a Tier I capital ratio of 7% and a total capital ratio of 10%. As on October 31, 2002, RBC's Tier 1 and total capital ratios were 9.3% and 12.7%, respectively, compared to 8.7% and 11.8% on October 31, 2001. RBC maintained capital ratios that exceeded its medium-term goals of 8.0% for the Tier I ratio and 11-12% for the total capital ratio. Effective from November 1, 2002, RBC raised its medium-term Tier I capital ratio target to 8-8.5% from 8%.

Source: ICFAI Press.

² The Office of Superintendent of Financial Institutions.

Appendix III

Enterprise Risk Management at BNP Paribas

Introduction

The 1998 merger between BNP, the largest bank in France and Paribas, a major investment and finance bank, gave rise to BNP Paribas (BNP) one of the largest banks in Europe. BNP operated some 2,200 retail branches in France and had operations in more than 85 other countries. The company provided corporate, retail, and investment banking services. Other activities included specialized financing, private banking, asset management, and insurance. In 2002, BNP Paribas had a total assets of \notin 710319 million and anet income of \notin 3295 million.

BNP had global ambitions. During 2001, it forged links with several foreign banks to form GSPS LLC, to offer global Visa card solutions. To strengthen its presence in the US, BNP had acquired United California Bank (UCB). It also owned BancWest, the parent of Bank of the West and First Hawaiian Bank. BNP also controlled consumer lender Cetelem and Belgian investment firm Cobepa. BNP bought German online discount brokerage ConSors from SchmidtBank and merged the new addition with existing online unit Cortal to form CortalConSors. It was growing its asset-financing business, through acquisitions such as US-based Capstar Partners. In China, BNP had won permission to start a joint venture with Wuhan-based Changjiang Securities. But BNP had been pulling back from a three-decade-old joint venture with Germany's Dresdner Bank (now owned by German insurance giant Allianz) citing differences in strategies. The company had bought more than 10% of Crédit Lyonnais from the French government and purchased more than 5% on the open market soon after, leading to rumors that BNP Paribas might acquire its rival. But BNP had finally lost out to be Crédit Agricole.

Overview of Risks

Five principles defined the scope of BNP's Global Risk Management Department (GRM).

A. ACTIVE CONTROL

GRM was responsible for ensuring that the risks taken by the bank were compatible with its profitability and credit rating objectives. GRM regularly reported to the Internal Control and Risk Management Committee of the Board on its main findings concerning risks, and how they were measured and consolidate them on a Group-wide basis. In 2002, several meetings of the Control and Risk Management Committee were held to discuss issues such as the telecoms, high technology, aeronautics and electricity utilities sectors, country risks and risks in trading with Japan and the US.

B. STRONG INDEPENDENCE

GRM reported directly to Executive Management and was outside any business line or territory authority. GRM had cross-functional teams in the main territories. In some businesses where the nature of the risks involved lent itself to a different approach – such as Retail Banking – GRM only supervised the activities of the business line's own Risk Management Function.

C. WIDE RANGE OF COMPETENCE

GRM had responsibility for all risks arising in the course of the Group's business. There were five main categories of risk: Credit risk, Market & Liquidity risk, Operational risk, Insurance risk (risk due to the specific risk arising from unexpected changes in claims experience) and New risks (risks generated by changes in the banking business).

Enterprise-wide Risk Management in Banks

The bank believed that each risk category required specific measuring and monitoring systems. Nevertheless, the growing complexity of the group's businesses and products meant that they were increasingly inter–locked. Coordination among the various specialists had therefore been stepped up, so that correlations were identified and action was taken on a timely basis to optimize the overall risk for the Group on an ongoing basis.

D. INTERVENTION AT ALL LEVELS OF THE RISK-TAKING AND MONITORING CHAIN

As part of risk decision-making, GRM performed the following core functions:

Policy: GRM made recommendations to Executive Management concerning risk acceptance policies and was responsible for approving new businesses and products that exposed the Group to new types of risk.

Measurement and Analysis: GRM analyzed the loan portfolio to identify future risks and anticipate potential increases in risk levels. It was responsible for guaranteeing the quality and consistency of risk-measurement methodologies and tools. GRM defined various risk scenarios and produced periodic estimates of the Bank's economic capital requirement, together with recommendations for active portfolio management;

Loan Approval and Trading Limits: GRM ensured that the risks taken by the business lines did not exceed the acceptable level and were consistent with the Group's rating and profitability targets;

Monitoring and Control: GRM was responsible for the quality and effectiveness of risk monitoring procedures and their consistent application, correct valuation of outstanding loans and market positions, and provisions for credit, counterparty, market and liquidity risks;

Reporting: GRM was responsible for comprehensive and reliable reporting of risks to Executive Management, business lines, auditors, regulatory authorities and rating agencies. It attempted to ensure that risk-monitoring requirements were properly factored into the information system of the Bank.

E. GLOBAL ORGANIZATION

GRM teams were based in the various territories. These teams were placed under the direct authority of GRM and had a clear functional reporting relationship with GRM. In some cases, where the risks involved were of a different nature as in Retail Banking, the business line concerned had its own risk management function. In this case, clear rules were drawn up between the division and GRM concerning the functional reporting relationship.

GRM's organization structure was tailored to reflect the different types of risk.

- Credit Risk France monitored the credit risks of the Retail Banking business and the real estate financing business, which were under the supervision of the Asset Management and Services business;
- International Credit Risk monitored risks of corporate customers throughout the Corporate and Investment Banking and International Retail Banking divisions, as well as risks of large corporates in the retail financial services business;
- Counterparty Risk and Financial Institutions monitored risks on banks and financial institutions, as well as on private banking clients outside France. It also monitored the methods used to assess and report counterparty risks generated by the Fixed Income, Currency Instruments, Securities Services and Asset-Liability Management units;

- Market and Liquidity Risk was responsible for monitoring market and liquidity risks throughout the Group;
- Operational Risk defined the framework for monitoring operational risks for all Group entities;
- Industry and Portfolio Analysis and Reporting was the cross-functional unit in GRM responsible for providing industry expertise and analyzing group-level credit risks. This unit drafted credit and rating policies, developed risk measurement methodologies and consolidated risk data for reporting purposes.

Credit Risk

BNP's lending operations were subject to the General Lending Policy approved by the Risk Policy Committee chaired by the Chairman and Chief Executive Officer. The Group-level strategy was then rolled down to various divisions and business lines, which were fully responsible and accountable for managing risks. The group aimed at achieving a sound diversification of risks among borrowers and industries, taking into account country risks. The Group's overall portfolio of commercial loans and commitments totalled EUR 387 billion as on 31 December 2002, down 3.5% from the figure as on 31 December 2001.

Decision-making

The Chairman and Chief Executive Officer had the ultimate authority for lending decisions. This authority was delegated to various levels in the organization through a system of discretionary lending limits. All lending decisions had to be approved by a formally designated member of the Risk Management Function. Approvals were systematically documented, either by means of a signed approval form or in the minutes of formal meetings of Credit Committees. No commitments could be entered into until the appropriate approval procedure had been completed.

Lending limits were set by counterparty or group of related counter-parties when aggregating risks was economically justified. The limit varied depending on internal credit ratings and the specific nature of the business concerned. The system of discretionary lending limits ensured that risk management principles were applied consistently and that loan applications representing large amounts or which were unusually complex or sensitive, were submitted for approval at the appropriate level. All discretionary lending limits were required to be approved by GRM.

Certain types of lending commitments, such as loans to banks, sovereign loans and loans to customers operating in certain industries, were required to be approved at a higher level. In addition, the loan application might have to be backed up by the recommendation of an industry expert or of designated specialists and some credit restrictions might apply.

Loan applications had to comply with the Bank's General Credit Policy and with any specific policies applicable to the business line or the type of facility requested. Any exception needed to be approved by the next level of lending authority. The same policy applied to loan applications that were not unanimously approved. To be considered, all loan applications had to comply with the applicable laws and regulations. The Group Credit Committee chaired by one of the Chief Operating Officers or the Risk Director, had ultimate decision-making authority for all credit and counterparty risks.

Monitoring

BNP had established a comprehensive credit risk monitoring and reporting system. Consolidated exposures were calculated at all levels. At counterparty level, exposures to several customers were consolidated in cases where it was probable that if one of these customers ran into financial difficulties, the other customers in the "group" would also have difficulty in fulfilling their commitments. Consolidation also helped the management in getting a global view of the bank's aggregate exposure to credit risks. Daily exception reports were produced and various techniques were used to produce early warning signals.

Provisioning

The Group Debtor Committee chaired by the Chairman and Chief Executive Officer met monthly to examine all sensitive and problem loans in excess of a certain amount. In the case of problem loans, the committee decided on any adjustments to the related provisions, based on the recommendations of the business line and GRM.

As a general principle, all loans qualified as doubtful were reviewed at least once every three months with the aim of determining the impairment loss to be recognized in accordance with generally accepted accounting principles. The amount of the impairment loss took into account potential recoveries, including the value of any collateral or other guarantees.

According to the applicable regulations, interest accruals on doubtful loans were either suspended or continued. In the latter case, a provision was recorded immediately in order to offset the accrual. Where possible or desirable, due to the specific nature of the lending activities concerned – for example, consumer finance – case-by-case provisions were replaced by statistical provisions. In addition to these specific or statistical provisions, the bank sometimes also set aside general provisions to cover a probable increase in risks on a specific industry or country.

Rating Policy

BNP believed it had a comprehensive rating system, which complied with the requirements prescribed by the regulatory authorities for the determination of risk-weighted assets used to compute capital adequacy ratios.

For loans to companies, the rating system was based on a default probability rating and an overall recovery rate, which depended on the structure of the transaction.

There were 12 counterparty ratings. eight were for excellent, good and average clients, two were related to clients in an uncertain situation who were on the watch list, and two concerned customers in default based on the regulatory definition. Ratings were determined at least once a year. BNP believed it had high quality tools to support the rating process, including analysis aid and credit scoring systems. The techniques used, depended on the nature of the risk.

Various methods were used to check rating consistency and the reliability of the rating system. These included analysis of data stored in the Internal Default Database. In Retail banking, rating policies were based on statistical analysis of groups of risks with the same characteristics.

Diversification of Counterparty Risks

BNP emphasized the diversification of counterparty risk. Concentrations of counterparty risks were reviewed regularly and corrective action was taken where necessary. Corporate and institutional customers accounted for three-quarters of the total. The 10 largest customer groups represented less than 4% of the total.





Figure 2: BNP – Industry Break down of Commercial Loans and Commitments



Source: Annual Report BNPParibas, 2002.

Diversification of Industry Risks

BNP attempted to diversify industry risks, based on the opinions of independent industry experts, backed by studies of underlying trends and factors. The depth of industry research varied according to the importance of the industry in the total portfolio, the technical expertise necessary to assess industry risks, the cyclical nature of the industry and its level of globalization, and other specific risk issues. Where appropriate and for substantial loans, the opinion of an industry expert was sought. The Risk Policy Committee approved the list of industries for which the opinion of an industry expert was required.







Diversification of Geographic Risks

BNP followed a policy of avoiding excessive concentrations of risk in countries with weak political and economic infrastructures. Country risk exposure limits were set by the Group Credit Committee, based on recommendations made by the business lines and customer-centric units. Lending commitments by the business lines within these overall limits were monitored by GRM. The Economic Research unit attributed a rating to each country. The breakdown and structure of country risks were reviewed annually by the Risk Policy Committee.

BNP's exposure was heavily weighted towards Europe and North America. The majority of loans and commitments (56% of the portfolio) were to borrowers in Western Europe, with France accounting for 39% of the total. BancWest's acquisition of UCB led to a 2 point increase in BNPs' commitments in North America. Japan, which remained mired in recession, accounted for only 1% of the total. BNP believed the credit quality of the loan portfolio in this country was excellent. In other geographic areas, BNP generally preferred either local currency loans to selected borrowers or commitments related to international trade transactions.



Figure 4: BNP - Geographic Breakdown of Commercial Loans and Commitments

Source: Annual Report BNPParibas, 2002.

Exhibit I: BNP – Doubtful Commitments

In Billions of Euros	31/12/2002	31/12/2001
Doubtful commitments	15.2	15.1
Specific provisions	10.1	10.0
Provision rate	66%	66%

Source: Annual Report BNPParibas, 2002.

Exhibit II: BNP -	– Doubtful Loan	s breakdown 🛛	by T	ype of	Customer
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	Breakdown of Doubtful Loans	Breakdown of Provisions
Banks	2.2%	2.0%
Corporates	63.4%	65.8%
Governments and central banks	1.5%	0.8%
Institutions	0.6%	0.5%
Individuals and self-employed	31.4%	30.1%
Not analyzed	0.8%	0.8%
Total	100.0%	100.0%

Source: Annual Report BNPParibas, 2002.

	Breakdown of Doubtful Loans	Breakdown of Provisions
North America	11.4%	11.4%
Other European countries	7.3%	7.2%
European Economic Area	7.5%	8.9%
France	53.5%	55.6%
Japan	0.0%	0.0%
Africa & Middle East	7.0%	8.1%
Latin America	5.9%	3.6%
Asia-Oceania	6.8%	4.4%
Not analyzed	0.6%	0.8%
Total	100.0%	100.0%

Exhibit III: BNP – Doubtful Loans Breakdown by Geographic Area

Source: Annual Report BNPParibas, 2002.

Exhibit IV: BNP – Doubtful Loans Industry Breakdown

	Breakdown of Doubtful Loans	Breakdown of Provisions
Food	3.5%	2.9%
Insurance	1.6%	1.3%
Automotive	1.8%	2.0%
Other	6.7%	7.4%
Construction	2.2%	2.3%
Chemical	0.8%	0.4%
Wholesalers	9.9%	10.4%
Retailers	3.5%	3.0%
Energy	2.2%	1.0%
Household equipment	1.1%	1.2%
Finance	2.2%	2.5%
Real estate	6.2%	6.7%
Manufacturing	3.2%	3.0%
Leisure & entertainment	1.0%	0.7%
Materials	2.5%	2.5%
Capital goods	1.1%	1.2%
Mining	0.7%	0.3%
Individuals	24.6%	24.7%
B2B	2.6%	2.5%
Utilities	0.5%	0.5%
Sovereign, local govt., finances	1.6%	1.1%
Technology	0.8%	0.8%
Telecoms	7.2%	4.9%
Transport	4.6%	5.0%
Not analyzed	8.0%	11.6%
Total	100.0%	100.0%

Source: Annual Report BNPParibas, 2002.

LIQUIDITY MANAGEMENT

BNP's cash needs were managed centrally by the ALM Treasury Department. The Treasury unit was responsible for Interbank refinancing and short-term debt issues. The Asset/Liability Management unit was in charge of senior and subordinated funding programmes, asset-backed securities issues on behalf of the specialized subsidiaries of the Retail Banking Division and preferred stock issues.

Senior and junior debt issues with maturities in excess of one year totalled EUR 8.9 billion in 2002, compared to EUR 5.4 billion the previous year. All senior debt issues – for a total of EUR 5.4 billion – were in the form of private placement notes. Subordinated debt issues totalled EUR 3.5 billion, of which EUR 3.2 billion were placed through public offerings and the balance with the French Retail Banking network.

Asset-backed securities issues floated in 2002 raised around EUR 1.3 billion, including EUR 440 million for UCB and its Spanish subsidiary, UCI, EUR 655 million for Cettelem and EUR 300 million for Centroleasing. As of 31 December 2002, loans totaling EUR 8.2 billion had been refinanced through securitization.

During the year, BNP floated two preferred stock issues, including a USD 650 million issue placed with Private Banking customers in Asia and a EUR 600 million issue placed with European institutional investors. As of 31 December 2002, outstanding preferred stock totalled EUR 3.1 billion.

The Group's short- and medium-term liquidity position was regularly measured on a consolidated basis, by business line and by currency. BNP complied with the overnight limits set for capital market transactions and the mismatch limits set for banking transactions with maturities of more than one year.

The consolidated liquidity mismatch for positions beyond one year was measured on the basis of contractual maturities (for loans and deposits, including undrawn confirmed lines of credit weighted at 30%), and internal maturity assumptions (for demand loans and deposits, pass-book savings accounts, etc.) The mismatch for liability positions beyond one year amounted to 16.4% as on 31 December 2002.

Operational Risk

Operational risk correspondents had been appointed in each business line and each corporate department, to ensure that Group operational risk management guidelines were implemented. They were backed by numerous risk officers within their units.

Various initiatives had been launched to produce detailed measurements of operational risk, to comply with future regulatory requirements. An Incident Management Policy and an Incident Management System ("IMS") had been established in order to collect detailed historical loss data, for the entire Group. The Incident Management System required incidents to be reported as soon as they were detected. The data was then validated by the operating units. Cross-functional incident reporting was coordinated by the network of operational risk correspondents. Data collection procedures were subject to regular, independent audits.

BNP was one of the founder members of the ORX (Operational Risk Exchange) data collection consortium. This consortium collected data on internal losses at member institutions. Other methods of obtaining qualitative data were also being developed jointly with the business lines and corporate departments. To improve decision-making processes and reduce the level of annual losses due to operational risks. They would also provide the data needed to calculate regulatory capital and allocate equity to cover this risk.

While GRM was responsible for developing operational risk management systems, promoting increased awareness of these risks and assessing them, the actual risks and any related insurance cover continued to be managed by the corporate functions concerned. This applied in particular to important operational risks like legal, human resources and systems security risks.

INFORMATION PROTECTION

BNP's information systems security policy was monitored by Group Management. Systems security considerations were factored into all IT projects from the outset. Periodic monitoring was used to ensure that the level of systems security was maintained. This was backed up by a technical intelligence service to ensure that the latest advances in systems security were implemented.

Over the period 2000-2002, BNP's European IT system had developed from a disparate system spread over several regional servers into a single center processing all customer transactions for retail banking, corporate and investment banking and some private banking and asset management activities in France and continental Europe.

Within this unified architecture, a dedicated site backed up central system data for French Retail Banking and other business lines, using real-time high-speed links. Globally, the same type of rationalization and protection was employed around the Singapore hub for Asia, the New York hub for North America and the Geneva hub for international private banking. The continuation of operations was one of the major concerns for both the management and the various business lines. Contingency and disaster recovery plans, were updated regularly.

Source: ICFAI Press.

Chapter XIII

The New Basel Accord – Implication for Banks

After reading this chapter, you will be conversant with:

- An Overview
- Basel II Framework The Three Pillar Architecture
- Organizations Affected by Basel II
- Impact of Basel II

Effective risk management strategies can be implemented by integrating effective bank-level management, operational supervision and market discipline. It is also imperative for financial institutions to update their risk management practices in accordance with prevalent legislation and regulatory environment. With these aspects in mind, the Basel Committee on Banking Supervision published the Capital Adequacy Accord, also known as the Basel Accord, in 1988. The Basel Accord defined the parameters of risk management and capital adequacy for Financial Service Providers (FSPs). With the growth in the financial services sector, the Committee felt the need to update the Accord in line with new developments. As a result, it proposed the New Basel Capital Accord, also known as Basel II, in June 1999. With its new risk-sensitive framework, Basel II aims to fill the gaps left by the previous Accord. Basel II was devised to improve the soundness of the financial system by aligning regulatory capital requirement to the underlying risks of the banking industry. It encourages banks to conduct better risk management and enhance market discipline. According to the Committee, financial institutions should integrate Basel II in their operations by the year-end 2006. Efficient risk management, as outlined by Basel II, can be ensured by leveraging information technology. A more coherent architecture, would be required for process automation and integration, and cost reduction mechanisms. The chapter discusses Basel II, its framework and its impact on financial organizations.

AN OVERVIEW

Financial markets have always been sensitive towards incurring heavy losses due to either poor risk management policies or frauds – as both would reduce public confidence, which is the mainstay of the sector. Thus, banking institutions and investment firms felt the need to improve their measures for security and risk management. To achieve this, the Basel Accord was signed in 1988.

The Basel Accord was adopted by the Central Banks of over 100 countries as a basis of risk management within their banking system. It aimed to ensure an adequate level of capital in the international banking system. However, the regulatory capital requirement set by the Accord proved to be incompatible with the new sophisticated internal measures of economic capital. In addition, the Accord was unable to recognize credit risk techniques, such as collateral and guarantees. This resulted in an inflexible system and ultimately increased the risk for financial institutions. Basel II was devised to plug these gaps. A Basel II implementation allows bankers to adequately emphasize their own internal risk management methodologies. Bankers can also provide more incentives and options for risk management, thereby increasing flexibility of their systems. In addition to this, Basel II provides a variety of benefits to the banking system. These include enhanced risk management, efficient operations, and higher revenues to the banking community.

Along with the increased benefits, Basel II has also laid down some controls on the international banking system. This is primarily in the form of a higher capital requirement to underwrite mismanagement of risks and lack of infrastructural controls in many economies. The global acceptance for Basel II is not far and most banks across the world will soon come under the purview of this Accord.

	Existing Accord		New Accord
1.	Focus on single risk.	1.	More emphasis on banks' measures – own internal methodology, supervisory review and market discipline.
2.	One size fits all.	2.	Flexibility, menu of approaches, incentive for better risk management.
3.	Broad brush structure.	3.	More risk sensitivity.

Comparing the new Accord with the existing one.
After a series of revisions, Basel II has been finalized. A major part of it will be applicable by the end of 2006. During this intervening period, banks and supervisors must develop the necessary systems and processes to comply with the standards laid down by Basel II. For instance, financial institutions have to maintain a history of vital data sets built prior to the implementation date of Basel II. This will help them seamlessly "migrate" to Basel II. In addition, many countries have already started work on draft rules that would integrate Basel capital standards with their national capital regimes. The Basel II Accord aims to ensure effective risk management and security systems in the financial sector. It has undergone rigorous revisions before its framework has been finally frozen for implementation.

THE BASEL II FRAMEWORK

Basel II intends to provide more risk-sensitive approaches while maintaining the overall level of regulatory capital within the financial system. This can be achieved through its meticulously designed framework that consists of three mutually reinforcing pillars as summarized in Figure 1.





Source: ICFAI Research Center.

PILLAR 1

Minimum Capital Requirements

The first pillar is designed to help cover risks within a financial institution. It aims to set minimum capital requirements and defines the current amount of capital. This pillar also stresses on defining the capital amount by quantifying risks such as Credit Risk, Operational Risk and Market Risk.

MEASURING CREDIT RISK

Credit Risk defines the minimum capital required to cover exposure to customers and counter parties. The Basel II framework provides a menu of approaches in respect of credit risk. They are:

- i. Standardized Approach,
- ii. Internal Rating Based (IRB) Approach
 - a. Foundation
 - b. Advanced.

- i. **Standardized Approach:** In this approach, the bank allocates a risk-weight to each of its assets and off-balance sheet positions. It then calculates a sum of risk-weighted asset values. A risk weight of 100% indicates that an exposure is included in calculation of assets at full value. The capital charge is equal to 8% of the asset value. This approach, while remaining essentially the same as in the earlier Accord, however, includes a higher sensitivity to risk. As per the earlier Accord, individual risk weights were dependent on the category of borrowers such as sovereign nations or banks. In Basel II however, these weights can be defined by referring to a rating provided by an external credit assessment agency.
- ii. Internal Ratings Based Approach (IRB): In this approach, banks use their internal evaluation systems to assess a borrower's credit risk. The results, attained by this process, are translated into estimates of a potential future loss, thereby defining the basis of minimum capital requirements.

The IRB Approach supports the following methodologies for corporate, sovereign and bank exposures:

Foundation: Using this methodology, banks can estimate the risk of default or the Probability of Default (PD) associated with each borrower. Additional risk factors such as Loss Given Default (LGD) and Exposure at Default (EAD) are standardized by supervisory rules that are laid down and monitored by regulating authorities.

Advanced: This methodology allows banks with sufficient internal capital to assess additional risk factors. These factors include Exposure at Default (EAD), Loss Given Default (LGD) and Maturity (M). It also allows banks to provide guarantees and credit derivatives on the risk of exposure. The ranges of risks in both these methodologies are more diverse than in the standardized approach, resulting in greater risk sensitivity.

Credit Risk Mitigation

The Consultative Document contains proposals for the recognition of certain credit risk mitigation techniques in the calculation of regulatory capital. These include collateral, guarantees and credit derivatives and on-balance sheet netting. Certain minimum conditions must be met in each case to qualify for relief of capital.

- In the case of collateral, these include legal certainty, low correlation with exposure and the operation of robust risk management practices.
- Similar requirements apply to on-balance sheet netting. For guarantees and credit derivatives a range of operational requirements are specified.

Asset Securitization

The Committee has put forward proposals that are designed to look through traditional asset securitisation structures to ensure that a capital charge is levied in respect of risks retained by the bank. Proposals are aimed at the level of originating, investing and sponsoring banks. Originating banks qualify for a relief from the capital charge only where it is established that the securitised assets have been effectively removed from the balance sheet. Any credit enhancements provided are deducted from the originating banks' regulatory capital.

Investing banks carry a capital charge based on the credit rating of the assets they hold, where they are using the standardised approach for credit risk. If they adopt the internal ratings based approach, the capital charge will be determined by their internal estimates of PD, etc.

Sponsoring banks must also deduct credit enhancements provided to securitisation structures from regulatory capital. Pure liquidity facilities provided by originators or sponsors are regarded as commitments for regulatory purposes. The Committee has proposed detailed operational rules to ensure that implicit credit protection is not being provided by originating or sponsoring banks through these liquidity facilities.

The New Basel Accord – Implication for Banks

MEASURING OPERATIONAL RISK

In Basel II, the operational risk can be measured using the following three approaches:

- i. **Basic Indicator Approach:** This is a traditional approach, which links the capital charge for operational risk to a single operational parameter, such as the bank's gross annual revenue. The capital charge is calculated as a fixed percentage of this parameter, defined as the 'Alpha Factor'.
- ii. Standardized Approach: This approach is a variant of the Basic Indicator Approach. Here, the activities of a bank are divided into standard industry business lines, such as corporate banking, trade finance and many more. These business lines are then mapped by banks into their internal framework. A percentage of capital charge, known as the 'Beta Factor', is defined for each business line. The bank can calculate its capital charge for a business line by applying the Beta Factor to the indicator value for the business line. The total capital charge for the bank is calculated as the sum total of all capital charges for individual business lines.
- iii. Internal Measurement Approach (IM): This is the most sophisticated of all the approaches. Here, risk is measured using the bank's internal loss data. Typically, a bank collects data inputs for a specified set of business lines and risk types. These inputs include an operational risk indicator, data indicating the probability of a loss event, and the losses incurred in case these events take place.

MEASURING MARKET RISKS

Market Risk determines the capital required to cover exposure to changes in market conditions – such as fluctuations in interest rates, foreign exchange rates, equity prices, and commodity prices. The approaches to determine market risk are the same as those defined in the earlier Accord.

Benefits of the First Pillar

The first pillar aims to refine the measurement the framework set out in the 1988 Accord by effectively reducing risk across the banking system. Different reporting systems, which comply with objectives set by this pillar, will help track and report risks as they occur, thus eliminating them at the outset. It will allow banks to set-up independent audit functions to scrutinize the possibilities of risks. The minimum capital requirement is expected to reduce considerably for banks and other financial institutions. Furthermore, banks will support a complete alignment of regulatory, book and economic capital.

PILLAR 2

Supervisory and Review Process

The second pillar of Basel II intends to ensure the presence of sound processes at each bank. This pillar would also provide the framework to assess the adequacy of the bank's capital, based on a thorough evaluation of its risks. The Basel II framework emphasizes the development of an internal capital assessment process by the bank management. Additionally, management should set targets for capital corresponding with the bank's risk profile and control environment.

Regulatory and supervisory bodies (either the Central Banks or bodies setup by the Central Bank or Government, for regulation and control) will review the internal process. This is done so that an assessment of the bank's capital adequacy in relation to its risks can be made. A point to note is that compliance with internal measurement methodologies, mitigation policies of credit risk, and securitization policies for minimum qualifying standards are subject to supervisory control. The supervising authority will also be responsible for reviewing operations and processes in trading, Internet Banking and Security Processing.

Benefits of the Second Pillar

The implementation of the second pillar demands increased interaction between bank managers and supervisory bodies. This increased level of interaction enhances the level of transparency within the organization. The second pillar helps achieve a higher level of security within the organization. A level of standardization and conformity is established across the enterprise. This in turn would help achieve higher returns with lower risk.

PILLAR 3

Market Discipline

The third pillar of the new framework attempts to boost market discipline through enhanced disclosure by banks. Basel II identifies the disclosure requirements and provides recommendations both on the defining methods for calculating capital adequacy, and risk management strategies. Effective disclosures by banks help market participants understand the bank's risk profile and adequacy of its capital positions, thereby facilitating market discipline. This strategy plays an important role in maintaining the confidence in a financial institution.

A guidance paper presented in January 2000 has six broad recommendations related to capital, risk exposure and capital adequacy. Based on these recommendations, the committee has laid down more specific quantitative and qualitative disclosures in key areas. These include the scope of application, composition of capital, risk exposure assessment and management processes, and capital adequacy. In general, it provides enhanced disclosures on risk and capital adequacy.

Benefits of the Third Pillar

The third pillar of the Basel II framework helps to increase awareness of all the risks in the banking sector through a process of detailed disclosure. It also helps align economic capital data to book and risk capital data. Further, this pillar reveals the annual losses incurred by business lines and asset classes. This helps increase transparency.

ORGANIZATIONS AFFECTED BY BASEL II

All banks and financial institutions in the G10 countries intend to incorporate the Basel II Accord through local regulators. A high possibility of the earlier accord being replaced by Basel II in the other countries also exists. The European Union is the first adopter of this accord, and the recommendations of this accord are being integrated into a new EU directive. In addition, the European Commission intends to apply this accord to all investments, businesses and credit institutions. The accord's adoption in other continents like Australia, Asia and in North and South America would be phased. It would primarily depend on proposals submitted by the regulatory authorities on implementation of the accord. The accord's scope of application will include banks and enterprises involved in securitization and with long-term equity holdings such as private equity and venture capital. It will also apply to all the parent and subsidiary companies of banking groups.

Basel II will be applicable to organizations offering the following financial services:

- Corporate Finance,
- Retail Banking,
- Asset Management,
- Trading and Sales,
- Payments and Settlements,
- Commercial Banking,

- Retail Brokerage,
- Agency and Custodial Services.

Basel II will facilitate data and system integration across banking groups.

Box 1

Based on the consensus reached on May 11, 2004 the Basel Committee was expected to publish the final Basel II Accord by the end of June 2004. The committee aims to implement Basel II for the standardized approach (using external ratings for calculating risk weights) and the foundation approach (using banks' internal ratings for calculating probabilities of default and related risk weights) by the end of 2006. For the advanced approach – using banks' internal ratings for calculating both probabilities of default and loss given default and related risk weights – the envisaged date of implementation is by the end of 2007.

Source: Are Basel II's pillars strong enough? Harald Benink.

THE IMPACT AND CHALLENGES OF BASEL II

Major banks and financial institutions in Europe and the United States have already started incorporating Basel II as part of their systems. The impact on the G-10 countries, where the accord is still being analyzed, will lead to a further regulation of banks, insurance and investment agencies. Japan, along with many developing economies may be affected due to a lack of transparency in its banking sector The New accord will significantly affect a wide range of organizations.

Operational Impact

Basel II will affect different spheres of financial activities. Therefore, its impact can be based on different kinds of operations conducted by organizations. These may include:

Rating Agencies

All Rating Agencies will incorporate the New Accord in their operational systems to evaluate banks globally. They intend to do this by using the advanced measurement approach with third-party evaluations. Incorporating this accord will result in establishing a more competitive and safer banking system.

Financial Industry

Basel II primarily applies to banks, but most legal rulings have emphasized on the harmonization of rules across all financial sectors. Many financial institutions that provide services such as credit cards and equities will also come under its purview.

Basel II will also have a major impact on the insurance sector, as it will allocate and account for risk capital and enterprise-wide risk management. The transparency achieved by Basel II for risk management and capital reserves will fundamentally change the reinsurance business.

It will also affect the securitization of risk. The impact of Basel II will extend to the state owned and managed financial institutions. These institutions will be required to meet market requirements for capital efficiency and optimization. In addition, banks in developing markets will need to invest capital for upgrading their infrastructure. When implemented, Basel II will lead to a restructuring of costs and prices for all financial services.

Finally, the introduction of operational risk in Basel II could affect the capital charge of banks. It would increase unless the bank adopts the more sophisticated approaches for measuring credit and operational risks.

Assessment of the Proposals

The Basel II proposals are assessed on two levels:

- a. An operational assessment, and
- b. Strategic assessment the longer-term strategic implications for banking and risk management.

OPERATIONAL ASSESSMENT

The second Consultative Document marks a significant change in the thinking of the Basel Committee. In the area of credit risk it has responded to the negative reaction to the proposed role for the rating agencies in determining capital requirements. The Internal Ratings Based approaches (IRB) are significant steps in aligning regulatory capital estimation with evolving best practice in credit risk management. Much work remains to be done to sort out the calibration and the operational requirements. However, when finalised, this will provide the basis for ensuring that banks will be rewarded for having sound capital allocation practices that are based on advanced risk management tools. In this sense, the proposals should achieve the objective of enhancing banking soundness insofar as this can be achieved through capital management.

However, the operational risk proposals are not ready for implementation to the satisfaction of the industry. Much of the detail has yet to be worked out. It is unlikely that the calibration of risk factors will be concluded in time for finalisation of the New Accord. Most banks have yet to begin to build loss data from which they may determine loss probabilities. Many of the factors driving operational risk are organisation specific. It is more logical to manage the risk through the supervisory review process in Pillar 2. This is the approach adopted for interest rate risk in the banking book, which was included in the first consultative document under minimum capital requirements but was moved, following the consultation process, into Pillar 2.

The approach adopted for interest rate risk is to set out a series of best practice principles on the management and supervision of this risk. This framework has the benefit of facilitating the evolution of best practice over time and could easily be extended to operational risk.

The Pillar 1 incentive structures further need considerable work. Operational requirements for internal measurement of credit and operational risks require validation of the risk assessment processes based on stringent data requirements. For example, banks are allowed to use their internal ratings for credit risk purposes if they are based on data collected over an extended period that would include a complete business cycle. The minimum observation period over which banks are required to hold the necessary data is five years.

STRATEGIC ASSESSMENT

An assessment of the strategic implications is complicated by the fact that so much depends on the final shape and detail of the New Accord. The proposals on credit risk, if suitably modified during the consultation process, should bring about an improved alignment between regulatory and economic measures of the capital. This will enable and encourage banks to exercise a sharper focus on shareholder value without the distortions from an outdated regulatory capital regime.

However, decisions on the treatment of operational risk could adversely impact on the objective of aligning economic and regulatory measures of capital. The quantum of capital proposed for operational risk is substantial. In addition, there is potential for conflict between the objectives of developing risk sensitive regulatory capital measures for operational risk and the Basel Committee's aim to maintain at least the same overall level of capital as is currently maintained by the banking system.

The New Basel Accord – Implication for Banks

The banking industry acknowledges that quantification of operational risk in a consistent manner is still at an early stage. The adoption of an over simplistic measure, without due recognition of specific risks and risk management processes could prejudice the integrity of the proposed new regulatory regime.

SUMMARY

- Effective risk management strategies can be implemented by integrating effective bank-level management, operational supervision and market discipline.
- The first pillar of Basel II is designed to help cover risks within the financial institutions.
- The second pillar of Basel II intends to ensure the presence of sound processes at each bank.
- The third pillar of Basel II attempts to boost market discipline through enhanced disclosure by banks.
- The consultative document contains proposals for the recognition of certain credit risk investigation techniques in the calculation of regulatory capital.

Appendix

BASEL II

Overview of The New Basel Capital Accord

Key Elements of the New Accord

The New Accord consists of three pillars:

- 1. minimum capital requirements,
- 2. supervisory review of capital adequacy, and
- 3. public disclosure.

Pillar 1

Minimum Capital Requirements

While the proposed New Accord differs from the current Accord along a number of dimensions, it is important to begin with a description of elements that have not changed. The current Accord is based on the concept of a capital ratio where the numerator represents the amount of capital a bank has available and the denominator is a measure of the risks faced by the bank and is referred to as risk-weighted assets. The resulting capital ratio may be no less than 8%.

Under the proposed New Accord, the regulations that define the numerator of the capital ratio (i.e., the definition of regulatory capital) remain unchanged. Similarly, the minimum required ratio of 8% is not changing. The modifications, therefore, are occurring in the definition of risk-weighted assets, that is in the methods used to measure the risks faced by banks. The new approaches for calculating risk-weighted assets are intended to provide improved bank assessments of risk and thus to make the resulting capital ratios more meaningful.

The current Accord explicitly covers only two types of risks in the definition of risk-weighted assets: (1) credit risk and (2) market risk. Other risks are presumed to be covered implicitly through the treatments of these two major risks. The treatment of market risk arising from trading activities was the subject of the Basel Committee's 1996 Amendment to the Capital Accord. The proposed New Accord envisions this treatment remaining unchanged.

The pillar one proposals to modify the definition of risk-weighted assets in the New Accord have two primary elements:

substantive changes to the treatment of credit risk relative to the current Accord; and the introduction of an explicit treatment of operational risk that will result in a measure of operational risk being included in the denominator of a bank's capital ratio. The discussions below will focus on these two elements in turn.

In both cases, a major innovation of the proposed New Accord is the introduction of three distinct options for the calculation of credit risk and three others for operational risk. The Committee believes that it is not feasible or desirable to insist upon a one-size-fits-all approach to the measurement of either risk. Instead, for both credit and operational risk, there are three approaches of increasing risk sensitivity to allow banks and supervisors to select the approach or approaches that they believe are most appropriate to the stage of development of banks' operations and of the financial market infrastructure. The following table identifies the three primary approaches available by risk type.

Credit Risk			Operational Risk		
i.	Standardized Approach	i.	Basic Indicator Approach		
ii.	Foundation IRB Approach	ii.	Standardized Approach		
iii.	Advanced IRB Approach	iii.	Advanced Measurement Approaches (AMA)		

Standardized Approach to Credit Risk

The standardized approach is similar to the current Accord in that banks are required to slot their credit exposures into supervisory categories based on observable characteristics of the exposures (Example, whether the exposure is a corporate loan or a residential mortgage loan). The standardized approach establishes fixed risk weights corresponding to each supervisory category and makes use of external credit assessments to enhance risk sensitivity compared to the current Accord. The risk weights for sovereign, interbank, and corporate exposures are differentiated based on external credit assessments. For sovereign exposures, these credit assessments may include those developed by OECD export credit agencies, as well as those published by private rating agencies.

The standardized approach contains guidance for use by national supervisors in determining whether a particular source of external ratings should be eligible for banks to use. The use of external ratings for the evaluation of corporate exposures, however, is considered to be an optional element of the framework. Where no external rating is applied to an exposure, the standardized approach mandates that in most cases a risk weighting of 100% be used, implying a capital requirement of 8% as in the current Accord. In such instances, supervisors are to ensure that the capital requirement is adequate given the default experience of the exposure type in question. An important innovation of the standardized approach is the requirement that loans considered past-due be risk-weighted at 150%, unless a threshold amount of specific provisions has already been set aside by the bank against that loan.

Another important development is the expanded range of collateral, guarantees, and credit derivatives that banks using the standardized approach may recognize. Collectively, Basel II refers to these instruments as credit risk mitigants. The standardized approach expands the range of eligible collateral beyond OECD sovereign issues to include most types of financial instruments, while setting out several approaches for assessing the degree of capital reduction based on the market risk of the collateral instrument. Similarly, the standardized approach expands the range of recognized guarantors to include all firms that meet a threshold external credit rating.

The standardized approach also includes a specific treatment for retail exposures. The risk weights for residential mortgage exposures are being reduced relative to the current Accord, as are those for other retail exposures, which will now receive a lower risk weight than that for unrated corporate exposures. In addition, some loans to Small- and Mediumsized Enterprises (SMEs) may be included within the retail treatment, subject to meeting various criteria.

By design the standardized approach draws a number of distinctions between exposures and transactions in an effort to improve the risk sensitivity of the resulting capital ratios. The same can also be said of the IRB approaches to credit risk and those for assessing the capital requirement for operational risk where capital requirements are more closely linked to risk. In order to assist banks and national supervisors where circumstances may not warrant a broad range of options, the Committee has developed the 'simplified standardized approach' outlined in Annex 9 of CP3. The annex collects in one place the simplest options for calculating risk-weighted assets. Banks intending to adopt the simplified standardized methods are also expected to comply with the corresponding supervisory review and market discipline requirements of the New Accord.

Internal Ratings-based (IRB) Approaches

One of the most innovative aspects of the New Accord is the IRB approach to credit risk, which includes two variants: a foundation version and an advanced version. The IRB approach differs substantially from the standardized approach in that banks' internal assessments of key risk drivers serve as primary inputs to the capital calculation. Because the approach is based on banks' internal assessments,

the potential for more risk sensitive capital requirements is substantial. However, the IRB approach does not allow banks themselves to determine all of the elements needed to calculate their own capital requirements. Instead, the risk weights and thus capital charges are determined through the combination of quantitative inputs provided by banks and formulas specified by the Committee.

The formulas, or risk weight functions, translate a bank's inputs into a specific capital requirement. They are based on modern risk management techniques that involve a statistical and thus quantitative assessment of risk.

Ongoing Dialogue with Industry

The participants has confirmed that use of such methods represents an important step forward for developing a meaningful assessment of risk at the largest most complex banking organizations in today's market.

The IRB approaches cover a wide range of portfolios with the mechanics of the capital calculation varying somewhat across exposure types. The remainder of this section highlights the differences between the foundation and advanced IRB approaches by portfolio, where applicable.

Corporate, Bank and Sovereign Exposures

The IRB calculation of risk-weighted assets for exposures to sovereigns, banks, or corporate entities uses the same basic approach. It relies on four quantitative inputs:

- 1. **Probability of Default (PD),** which measures the likelihood that the borrower will default over a given time horizon;
- 2. Loss Given Default (LGD), which measures the proportion of the exposure that will be lost if a default occurs;
- 3. **Exposure at Default (EAD),** which for loan commitments measures the amount of the facility that is likely to be drawn if a default occurs; and
- 4. **Maturity** (M), which measures the remaining economic maturity of the exposure.

Given a value for each of these four inputs, the corporate IRB risk-weight function described in CP3 produces a specific capital requirement for each exposure. In addition, for exposures to SME borrowers defined as those with annual sales of less than 50 million of Euros, banks will be permitted to make use of a firm size adjustment to the corporate IRB risk weight formula.

The foundation and advanced IRB approaches differ primarily in terms of the inputs that are provided by the bank based on its own estimates and those that have been specified by the supervisor. The following table summarises these differences.

Data Input	Foundation IRB	Advanced IRB
Probability of Default (PD)	Provided by bank based on own estimates	Provided by bank based on own estimates
Loss given Default (LGD)	Supervisory values set by the Committee	Provided by bank based on own estimates
Exposure at Default (EAD)	Supervisory values set by the Committee	Provided by bank based on own estimates
Maturity (M)	Supervisory values set by the Committee Or At national discretion, provided by bank based on own estimates (with an allowance to exclude certain exposures)	Provided by bank based on own estimates (with an allowance to exclude certain exposures)

The table makes clear that for corporate, sovereign, and interbank exposures, all IRB banks must provide internal estimates of PD. In addition, advanced IRB banks must provide internal estimates of LGD and EAD, while foundation IRB banks will make use of supervisory values contained in CP3 that depend on the nature of the exposure. Advanced IRB banks will generally provide their own estimates of remaining maturity for these exposures, although there are some exceptions where supervisors can allow fixed maturity assumptions to be used instead. For foundation IRB banks, supervisors can choose on a national basis whether all such banks are to apply fixed maturity assumptions described in CP3 or to provide their own estimates of remaining maturity.

Another major element of the IRB framework pertains to the treatment of credit risk mitigants, namely, collateral, guarantees and credit derivatives. The IRB framework itself, particularly the LGD parameter, provides a great deal of flexibility to assess the potential value of credit risk mitigation techniques. For foundation IRB banks, therefore, the different supervisory LGD values provided in CP3 reflect the presence of different types of collateral. Advanced IRB banks have even greater flexibility to assess the value of different types of collateral. With respect to transactions involving financial collateral, the IRB approach seeks to ensure that banks are using a recognized approach to assessing the risk that such collateral could change in value, and thus a specific set of methods is provided, as in the standardized approach.

Retail Exposures

For retail exposures, there is only a single, advanced IRB approach and no foundation IRB alternative. The key inputs to the IRB retail formulas are PD, LGD and EAD, all of which are to be provided by the bank based on its internal estimates. In contrast to the IRB approach for corporate exposures, these values would not be estimated for individual exposures, but instead for pools of similar exposures.

In light of the fact that retail exposures address a broad range of products with each exhibiting different historical loss experiences, the framework divides retail exposures into three primary categories:

- 1. exposures secured by residential mortgages,
- 2. Qualifying Revolving Retail Exposures (QRRE), and
- 3. other non-mortgage exposures also known as 'other retail'.

Generally speaking, the QRRE category captures unsecured revolving credits that exhibit appropriate loss characteristics, which would include many credit card relationships. All other non-mortgage consumer lending including exposures to small businesses falls into the 'other retail' category. A separate risk-weight formula for each of the three categories is provided in CP3.

Specialized Lending

Basel II distinguishes several sub-categories of wholesale lending from other forms of corporate lending and refers to them as specialized lending. The term specialized lending is associated with the financing of individual projects where the repayment is highly dependent on the performance of the underlying pool or collateral. For all but one of the specialized lending sub-categories, if banks can meet the minimum criteria for the estimation of the relevant data inputs, they can simply use the corporate IRB framework to calculate the risk weights for these exposures. However, in recognition that the hurdles for meeting these criteria for this set of exposures may be more difficult in practice, CP3 also includes an additional option that only requires that a bank be able to classify such exposures into five distinct quality grades. CP3 provides a specific risk weight for each of these grades.

For one sub-category of specialized lending, 'High Volatility Commercial Real Estate' (HVCRE), IRB banks that can estimate the required data inputs will use a

separate risk-weight formula that is more conservative than the general corporate risk-weight formula in light of the risk characteristics of this type of lending. Banks that cannot estimate the required inputs will classify their HVCRE exposures into five grades, for which CP3 also provides specific risk weights.

Equity Exposures

IRB banks will be required to separately treat their equity exposures. Two distinct approaches are described in CP3. One approach builds on the PD/LGD approach for corporate exposures and requires banks to provide own PD estimates for the associated equity exposures. This approach, however, mandates the use of a 90% LGD value and also imposes various other limitations, including a minimum risk weight of 100% in many circumstances. The other approach is intended to provide banks with the opportunity to model the potential decrease in the market value of their equity holdings over a quarterly holding period. A simplified version of this approach with fixed risk weights for public and private equities is also included.

Implementation of IRB

By relying on internally generated inputs to the Basel II risk weight functions, there is bound to be some variation in the way in which the IRB approach is carried out. To ensure significant comparability across banks, the Committee has established minimum qualifying criteria for use of the IRB approaches that cover the comprehensiveness and integrity of banks' internal credit risk assessment capabilities. While banks using the advanced IRB approach will have greater flexibility relative to those relying on the foundation IRB approach, at the same time they must also satisfy a more stringent set of minimum standards.

The Committee believes that banks' internal rating systems should accurately and consistently differentiate between different degrees of risk. The challenge is for banks to define clearly and objectively the criteria for their rating categories in order to provide meaningful assessments of both individual credit exposures and ultimately an overall risk profile. A strong control environment is another important factor for ensuring that banks' rating systems perform as intended and the resulting ratings are accurate. An independent ratings process, internal review and transparency are control concepts addressed in the minimum IRB standards.

Clearly, an internal rating system is only as good as its inputs. Accordingly, banks using the IRB approach will need to be able to measure the key statistical drivers of credit risk. The minimum Basel II standards provide banks with the flexibility to rely on data derived from their own experience, or from external sources as long as the bank can demonstrate the relevance of such data to its own exposures. In practical terms, banks will be expected to have in place a process that enables them to collect, to store and to utilize loss statistics over time in a reliable manner.

Securitization

Basel II provides a specific treatment for securitization, a risk management technique that the current Accord does not fully contemplate. The Committee recognizes that securitization by its very nature relates to the transfer of ownership and/or risks associated with the credit exposures of a bank to other parties. In this respect, securitization is important in helping to provide better risk diversification and to enhance financial stability.

The Committee believes that it is essential for the New Accord to include a robust treatment of securitization. Otherwise the new framework would remain vulnerable to capital arbitrage, as some securitizations have enabled banks under the current Accord to avoid maintaining capital commensurate with the risks to which they are exposed. To address this concern, Basel II requires banks to look to the economic substance of a securitization transaction when determining the appropriate capital requirement in both the standardized and IRB treatments.

As elsewhere in the standardized approach to credit risk, banks must assign supervisory risk weights to securitization exposures based on various criteria. One noteworthy point is the difference in treatment of lower quality and unrated securitizations vis-à-vis comparable corporate exposures. In a securitization, such positions are generally designed to absorb all losses on the underlying pool of exposures up to a certain level. Accordingly, the Committee believes this concentration of risk warrants higher capital requirements. In particular, for banks using the standardized approach, unrated securitization positions must be deducted from capital.

For IRB banks that originate securitizations, a key element of the framework is the calculation of the amount of capital that the bank would have been required to hold on the underlying pool had it not securitized the exposures. This amount of capital is referred to as KIRB. If an IRB bank retains a position in a securitization that obligates it to absorb losses up to or less than KIRB before any other holders bear losses (i.e. a first loss position), then the bank must deduct this position from capital. The Committee believes that this requirement is warranted in order to provide strong incentives for originating banks to shed the risk associated with highly subordinated securitization positions that inherently contain the greatest risks. For IRB banks that invest in highly rated securitization exposures, a treatment based on the presence of an external rating, the granularity of the underlying pool, and the thickness of an exposure has been developed.

Because of their importance in ensuring the smooth functioning of commercial paper markets and their importance to corporate banking generally, the Basel II securitization framework includes an explicit treatment of liquidity facilities provided by banks. In the IRB framework, the capital requirement for a liquidity facility facility is dependent upon a number of factors including the asset quality of the underlying pool and the degree to which credit enhancements are available to absorb losses prior to use of the facility. Each is a critical input to the supervisory formula designed for use by originating banks to calculate capital requirements for unrated positions, such as liquidity facilities. A treatment of liquidity facilities in the standardized approach is also provided which sets out various criteria for ensuring that more preferential treatment is only provided to those liquidity facilities where the risks are lower.

Many securitizations of revolving retail exposures contain provisions that call for the securitization to be wound down if the quality of securitized assets begins to deteriorate. The Basel II proposals include a specific treatment of securitizations with these 'early amortization' features, given that such mechanisms can in effect partly shield investors from fully sharing in the losses of the underlying accounts. The Committee's approach is based on a measure of the quality of the underlying assets in the pool. When this is high, the approach implies a zero capital requirement associated with the securitized exposures. As the quality deteriorates, however, the bank must increasingly hold capital as if future draws on existing credit card lines would remain on its balance sheet.

BASEL II

Overview of The New Basel Capital Accord

Operational Risk

The Committee believes that operational risk is an important risk facing banks and that banks need to hold capital to protect against losses from it. Within the Basel II framework, operational risk is defined as the risk of losses resulting from inadequate or failed internal processes, people and systems, or external events. This is another area where the Committee has developed a new regulatory capital approach. As with credit risk, the Committee builds on banks' rapidly developing

internal assessment techniques and seeks to provide incentives for banks to improve upon those techniques, and more broadly, their management of operational risk over time. This is particularly true of the **Advanced Measurement Approaches (AMA)** to operational risk described below.

Approaches to operational risk are continuing to evolve rapidly, but are not likely in the near term to attain the precision with which market and credit risk can be quantified. This situation has posed obvious challenges to the incorporation of a measure of operational risk within pillar one of the New Accord. Nevertheless, the Committee believes that such inclusion is essential to ensure that there are strong incentives for banks to continue to develop approaches to operational risk measurement and to ensure that banks are holding sufficient capital buffers for this risk. It is clear that a failure to establish a minimum capital requirement for operational risk within the New Accord would reduce these incentives and result in a reduction of industry resources devoted to operational risk.

The Committee is prepared to provide banks with an unprecedented amount of flexibility to develop an approach to calculate operational risk capital that they believe is consistent with their mix of activities and underlying risks. In the AMA, banks may use their own method for assessing their exposure to operational risk, so long as it is sufficiently comprehensive and systematic. The extent of detailed standards and criteria for use of the AMA are limited in order to accommodate the rapid evolution in operational risk management practices that the Committee expects to see over the coming years.

The Committee intends to review progress in regard to operational risk approaches on an ongoing basis. It has been strongly encouraged by the advances made at those banks that have been developing operational risk frameworks consistent with the spirit of the AMA. Management at these banking organizations has concluded that it is possible to develop a flexible and comprehensive approach to operational risk measurement within their firms.

Internationally, active banks and banks with significant operational risk exposure (for example, specialized processing banks) are expected to adopt over time the more risk sensitive AMA. Basel II contains two simpler approaches to operational risk: the basic indicator and the standardized approach, which are targeted to banks with less significant operational risk exposures. In general terms, the basic indicator and standardized approaches require banks to hold capital for operational risk equal to a fixed percentage of a specified risk measure.

In the basic indicator approach, the measure is a bank's average annual gross income over the previous three years. This average, multiplied by a factor of 0.15 set by the Committee, produces the capital requirement. As a point of entry for the capital calculation, there are no specific criteria for use of the basic indicator approach. Nevertheless banks using this approach are encouraged to comply with the Committee's guidance on sound practices for the management and supervision of operational risk, which was released in February 2003.

In the standardized approach, gross income again serves as a proxy for the scale of a bank's business operations and thus the likely scale of the related operational risk exposure for a given business line. However, rather than calculate capital at the firm level as under the basic indicator approach, banks must calculate a capital requirement for each business line. This is determined by multiplying gross income by specific supervisory factors determined by the Committee. The total operational risk capital requirement for a banking organization is the summation of the regulatory capital requirements across all of its business lines. As a condition for use of the standardized approach, it is important for banks to have adequate operational risk systems that comply with the minimum criteria outlined in CP3.

Banks using the basic indicator or standardized approaches to operational risk are not permitted to recognize the risk mitigating impact of insurance. However, banks using the AMA are permitted to do so subject to certain conditions.

Pillar 2

Supervisory Review

The second pillar of the New Accord is based on a series of guiding principles, all of which point to the need for banks to assess their capital adequacy positions relative to their overall risks, and for supervisors to review and take appropriate actions in response to those assessments. These elements are increasingly seen as necessary for effective management of banking organizations and for effective banking supervision, respectively.

Feedback received from the industry and the Committee's own work has emphasized the importance of the supervisory review process. Judgments of risk and capital adequacy must be based on more than an assessment of whether a bank complies with minimum capital requirements. The inclusion of a supervisory review element in the New Accord, therefore, provides benefits through its emphasis on the need for strong risk assessment capabilities by banks and supervisors alike. Further, it is inevitable that a capital adequacy framework, even the more forward looking New Accord, will lag to some extent behind the changing risk profiles of complex banking organizations, particularly as they take advantage of newly available business opportunities. Accordingly, this heightens the importance of, and attention supervisors must pay to pillar two.

The Committee has been working to update the pillar two guidance as it finalizes other aspects of the new capital adequacy framework. One update is in relation to stress testing. The Committee believes it is important for banks adopting the IRB approach to credit risk to hold adequate capital to protect against adverse or uncertain economic conditions. Such banks will be required to perform a meaningfully conservative stress test of their own design with the aim of estimating the extent to which their IRB capital requirements could increase during a stress scenario. Banks and supervisors are to use the results of such tests as a means of ensuring that banks hold a sufficient capital buffer. To the extent there is a capital shortfall, supervisors may, for example, require a bank to reduce its risks so that existing capital resources are available to cover its minimum capital requirements plus the results of a recalculated stress test.

Other refinements focus on banks' review of concentration risks, and on the treatment of residual risks that arise from the use of collateral, guarantees and credit derivatives. Further to the pillar one treatment of securitization, a supervisory review component has been developed, which is intended to provide banks with some insight into supervisory expectations for specific securitization exposures. Some of the concepts addressed include significant risk transfer and considerations related to the use of call provisions and early amortization features. Further, possible supervisory responses are outlined to address instances when it is determined that a bank has provided implicit (non-contractual) support to a securitization structure.

Pillar 3

Market Discipline

The purpose of pillar three is to complement the minimum capital requirements of pillar one and the supervisory review process addressed in pillar two. The Committee has sought to encourage market discipline by developing a set of disclosure requirements that allow market participants to assess key information about a bank's risk profile and level of capitalization. The Committee believes that public disclosure is particularly important with respect to the New Accord where reliance on internal methodologies will provide banks with greater discretion in determining their capital needs. By bringing greater market discipline to bear through enhanced disclosures, pillar three of the new capital framework can produce significant benefits in helping banks and supervisors to manage risk and improve stability.

Over the past year, the Committee has engaged various market participants and supervisors in a dialogue regarding the extent and type of bank disclosures that would be most useful. The aim has been to avoid potentially flooding the market with information that would be hard to interpret or to use in understanding a bank's actual risk profile. After taking a hard look at the disclosures proposed in its second consultative package on the New Accord, the Committee has since scaled back considerably the requirements, particularly those relating to the IRB approaches and securitization.

The Committee is aware that supervisors may have different legal avenues available in having banks satisfy the disclosure requirements. The various means may include public disclosures deemed necessary on safety and supervision grounds or information that must be disclosed in regulatory reports. The Committee recognizes that the means by which banks will be expected to share information publicly will depend on the legal authority of supervisors.

Another important consideration has been the need for the Basel II disclosure framework to align with national accounting standards. Considerable efforts have been made to ensure that the disclosure requirements of the New Accord focus on bank capital adequacy and do not conflict with broader accounting disclosure standards with which banks must comply. This has been accomplished through a strong and co-operative dialogue with accounting authorities. Going forward, the Committee will look to strengthen these relationships given that the continuing work of accounting authorities may have implications for the disclosures required in the New Accord. With respect to potential future modifications to the capital framework itself, the Committee intends to also consider the impact of such changes on the amount of information a bank should be required to disclose.

Approach of RBI for Implementation of BASEL II Accord

For the last two years RBI has been looking ahead and preparing the ground for advance steps towards eventual implementation of Basel II accord by the Indian Banking System. In the Monetary and Credit Policy for the year 2003-04 announced by the Governor Dr. Bimal Jalan 29th April 2003 before the release of document CP3 by Basel Committee, this viewpoint of RBI is expressly stated under paragraph 124 as reproduced hereunder:

"124. The New Capital Accord, presently under consideration of the Basel Committee, aims at capturing major risks inherent in a bank's operations and envisages enhancement of risk sensitivity. In order to equip banks to identify, measure, monitor and control the various types of risks assumed by them, RBI has, over a period, issued various guidelines and guidance notes taking into account the overall ability of banks to adopt them. The Reserve Bank has also taken a number of proactive steps and rationalized various prudential norms to prepare banks to understand the complexity and lessen the burden of costs involved in adhering to the international standards. These steps include phased provisioning, building up of Investment Fluctuation Reserve (IFR) to guard against interest rate risks, refining asset-liability management systems with tolerance levels, assessing the impact of the proposed New Capital Accord on banks by conducting Quantitative Impact Studies (QIS), relaxing exposure norms and permitting concessional risk weights in critical areas of importance and putting in place a sound 'Know Your Customer' (KYC) policy and adopting antimoney laundering measures.

"125. Taking into account the preliminary results of the QIS, the Basel Committee is fine-tuning risk weights assigned to banks' exposures to retail customers, Small and Medium Enterprises (SMEs), residential mortgages, securitization transactions, past due loans etc., reflecting the risk characteristics of these exposures. The Basel Committee is also considering entrusting the supervisors with discretion for estimating capital charge for operational risk appropriate to risk profile of the bank."

After publication of the document CP3, the third consultative document on 30.04.2003, RBI reviewed the different recommendations of the draft document in

the background of their eventual implementation by the banking system in India and submitted its comments. This document titled "Comments of the Reserve Bank of India on the Third Consultative Document of the New Basel Capital Accord" can viewed in the website of RBI.

The overall approach of RBI in formulating its comments is stated as under:

"The Reserve Bank of India (RBI) had forwarded its comments on the Second Consultative Paper (CP 2) of the New Basel Capital Accord to the Basel Committee on Banking Supervision (the Committee) in May 2001 and had also placed it on its website. The RBI recognizes that several of the concerns expressed and suggestions made by India and other emerging markets on the second consultative paper have been taken into account and addressed in the third Consultative Document (CP 3) after consultations and conducting a Quantitative Impact Study (QIS 3). Particularly, the provision of a Simplified Standardized Approach which provides for calculating risk-weighted assets, provision of preferential risk weights for retail exposures (75%) and residential mortgages (35%), aligning the capital requirements for credit risk in the trading book with the banking book and partial adoption of different approaches under the operational risk, reflect the Committee's endeavor in evolving a consensus which would facilitate adoption of the New Capital Accord in many jurisdictions.

"However, some of the issues relevant in the context of the emerging markets and developing countries are yet to be fully addressed. In its attempt to strive for more accurate measure of risks in banks, the simplicity of the present Capital Accord is proposed to be replaced, with a highly complex methodology which needs the support of highly sophisticated MIS/data processing capabilities. The complexity and sophistication essential for banks for implementing the New Capital Accord restricts its universal application in the emerging markets. Banks in these emerging markets form a significant segment in financial intermediation and are likely to find implementation of the New Capital Accord a major challenge in the medium term. Besides banks, supervisors would be required to invest considerable resources in upgrading technology systems, and human resources to meet the minimum standards. Banks in emerging markets would, therefore, face serious implementation challenges due to lack of adequate technical skills, under development of financial markets, structural rigidities and less robust legal system.

"The QIS 3 results for the Standardized Approach show an increase in capital requirements for all country groupings in respect of both Group 1 and Group 2 banks. The QIS 3 results from the participating non-G-10 countries show that overall increase in risk-weighted assets under the Standardized Approach was 19%, reflecting the impact of new operational risk charge (+ 15%) plus a credit risk contribution (+ 4%). These average contributions fall to + 11% and + 2% respectively (or an overall increase of around 13%) after some recalibration to the risk weights attached to claims on retail portfolios, residential property and past due loans.

"The Reserve Bank of India is fully committed to implement the best international practices. However, the level of preparedness of the banking system and the supervisors would vary from country to country. In view of this, it will be desirable to assign greater flexibility to national supervisors to calibrate risk weights on different types of exposures under the Standardized Approach. For example, the CP 3 has recalibrated the risk weights on claims on retail portfolio to 75% and residential property to 35%. The CP 3 has also indicated reduction in risk weights on past due loans from 150% to 100% or 50%, depending on the level of provisions held against such loans and to encourage banks to make higher provisions for past due loans by providing capital relief. The RBI welcomes such

adaptability in the approach shown in CP 3. The RBI also notes that the national supervisors can consider a higher risk weight on unrated claims on corporates if warranted in their jurisdictions. However, The RBI feels that there are many other areas in which national supervisors can be allowed greater flexibility in assigning a lower risk weight if the country-specific situation so warrants than following a "one-size-fits-all" approach based on the external ratings under the Standardized Approach. RBI has examined the various aspects of the proposals contained in the CP 3 and conveyed its specific comments thereon in this document."

By way of summarizing its comments RBI has stated under title "Conclusions" in the aforesaid document as under:

Conclusion

"6.1 RBI welcomes the adaptability in approach shown in CP 3. RBI also notes that the national supervisors can consider a higher risk weight on unrated claims on corporates if warranted in their jurisdictions. However, RBI feels that there are many other areas in which national supervisors can be allowed greater flexibility in assigning a lower risk weight if the country-specific situation so warrants than following a "one-size-fits-all" approach based on the external ratings under the Standardized Approach.

"6.2 The Committee's proposal to apply the New Accord to all 'internationally active banks' within the G-10 countries by end-2006 and permit a longer lead time for banks in the non-G-10 countries acknowledges the need for adopting a flexible approach in the implementation of the New Accord. As the main objective of the New Accord is to ensure competitive equality and providing a reasonable degree of consistency in application, it is necessary that all supervisors across the world should have a common definition of 'internationally active banks'. Hence, the Committee may evolve this definition.

"6.3 The QIS 3 results show that even under the Standardized Approach, which is likely to be adopted by most of banks in the emerging economies, there are:

- sizeable increases in credit risk charges for bank exposures as also for sovereign exposures.
- the impact of lower risk weights for retail exposures was on average less than expected.
- the increase in risk weight to 150% for past due loans was also significant.

"In view of the above, it may be necessary to review the relevant provisions of CP 3 with respect to the Standardized Approach.

"6.4 The proposal to allow banks to adopt an alternative exposure indicator for retail and commercial banking under the Alternative Standardized Approach for calculating operational risk capital charges should reckon only performing advances in these two business lines rather than the total portfolio of loans and advances, which would imply a substantial increase in capital charge for operational risk. The Committee may also like to review the beta factor proposed under the above approach where the banks are unable to disaggregate their gross income into the various business lines, with a view to incentivise banks to migrate from the Basic Indicator Approach to more advanced approaches for measuring operational risk.

6.5 RBI appreciates the Committee's efforts in evolving the New Accord containing proposals that are comprehensive in coverage. When implemented, these would go a long way in making the capital allocation more risk-sensitive and use of supervisory oversight with market discipline would reinforce the supervisory framework and ensure financial stability. However, the complexity and sophistication of the proposals restricts its universal application in emerging markets, where the banks continue to be the major segment in financial intermediation and would be facing considerable challenges in adopting all the proposals. Like the 1988 Capital Accord, the New Accord should also preserve the

The New Basel Accord – Implication for Banks

spirit of simplicity and flexibility to ensure universal applicability including emerging markets. The New Accord would involve shift in direct supervisory focus away to the implementation issues. Further, banks and the supervisors would be required to invest large resources in upgrading their technology and human resources to meet the minimum standards. The increasing reliance on external rating agencies in the regulatory process would undermine the initiatives of banks in enhancing their risk management policies and practices and internal control systems. The minimum standards set even for the IRB foundation approach are complex and beyond the reach of many banks."

It is of interest to point out that even in the USA the perceived complexities in the New Accord is taken into consideration and US regulators have decided as under:

"US bank regulators issued an Advance Notice of Proposed Rule-making in July regarding implementation of Basel II in the United States.....Under the proposal, only the top 10 largest, internationally active banks will have to comply with the new risk-based capital standard and its sophisticated internal ratings-based approach that is used to determine appropriate capital for credit risk. The regulators have suggested that other institutions may choose to opt-in if they can meet the requirements of the advanced approach and estimated another 10 to 15 banks will do just that. All other US banks and thrifts will remain subject to Basel I."

[Source: from an article titled "Basel II: A High-Risk Proposition" by Casey-Landry, Diane published in online journal "Community Banker"; Sep. 2003, Vol. 12 Issue 9, p8, 2p]

In further elaboration of her view point Ms. Diane Casey-Landry, president and chief executive officer of America Community Bankers, the author, has stated in the article as under:

"We believe that the new standard will raise significant competitive problems for community banks. The most recent Quantitative Impact Study shows that the main area of activity where minimum capital requirements will change substantially is the retail portfolio, where risk weights would be lowered significantly relative to the current accord. Even with an additional operational risk capital requirement, retail-oriented institutions will see a reduction in overall capital requirements under Basel II. This raises serious competitive issues for our members."

Specific comments of RBI conveyed to the Basel Committee for changes/ modifications/clarifications in the accord are discussed in the succeeding articles.

Approach of RBI for Implementation of BASEL II – Specific Comments of RBI

RBI has appreciated the Committee's efforts in evolving the New Accord containing proposals that are comprehensive in coverage. These proposals when implemented, would go a long way in making the capital allocation more risk-sensitive and use of supervisory oversight with market discipline would reinforce the supervisory framework and ensure financial stability. However, the RBI feels that there are many areas of the Draft Proposals in which national supervisors can be allowed greater flexibility in assigning a lower risk weight if the country-specific situation so warrants than following a "one-size-fits-all" approach based on the external ratings under the Standardized Approach. RBI has examined the various aspects of the proposals contained in the CP 3 and specific comments thereon are detailed hereunder:

Scope of Application (Paragraph 1)

The Committee has proposed that the New Accord will be applied to internationally active banks. However, it has been indicated in the Overview of the New Basel Capital Accord that the New Accord may be extended to include other

significant banks as national supervisors deem appropriate. RBI reiterates that the focus of the New Accord should be primarily on the internationally active banks. As the main objective of the New Accord is to ensure competitive equality and providing a reasonable degree of consistency in application, it is necessary that all supervisors, across the world should have a common definition of internationally active banks. Basel Committee may, therefore, define what constitute internationally active banks.

RBI Comment

In this regard, RBI is of the view that all banks with cross-border business exceeding say 20% or 25% of their total business may be defined as internationally active banks.

Cross Holding of Capital (Paragraph 10)

RBI, while appreciating the Committee's proposal that reciprocal cross-holdings of bank capital artificially designed to inflate capital position of banks should be deducted, feels that cross-holdings of equity and other regulatory investments may be allowed in principle, but may also need to be moderated to preserve the integrity of the financial system and minimize the adverse effect of systemic risk and contagion.

RBI Comment

RBI, therefore, reiterates the view that the Basel Committee may consider prescribing a material limit (10% of the total capital) up to which cross-holdings of capital and other regulatory investments could be permitted and any excess investments above the limit would be deducted from total capital.

Claims on Sovereigns (Paragraph 29)

The Committee's proposal that the Export Credit Agencies (ECAs) qualify for recognition only if they publish their country risk scores and subscribe to the OECD agreed methodology is appreciated. However, the OECD methodology and ECAs' country risk classifications are still confidential.

RBI Comment

RBI, therefore, reiterates that the ratings of only those ECAs should be eligible for use in assigning preferential risk weights which

- disclose publicly their risk scores, rating process and procedure,
- subscribe to the publicly disclosed OECD methodology, and
- are recognised by national supervisors.

Claims on Banks

The flexibility to provide uniform risk weight, i.e., one category less favorable than that assigned to claims on sovereign to all the banks (under first option) (Paragraph 35) militates the basic philosophy of aligning capital adequacy assessment more closely with the key elements of risk. The mere location may not necessarily be a good indicator of a bank's creditworthiness. This proposal provides competitive advantage to banks with weak financials by virtue of their having been incorporated in better-rated countries.

RBI Comment

RBI, therefore, reiterates its earlier view that the risk weighting of banks should be de-linked from the credit rating of sovereigns in which they are incorporated. Instead, preferential risk weights should be assigned on the basis of their underlying strength and creditworthiness.

The proposal to assign preferential risk weight to short-term claims (Paragraph 38) may lead to arbitrage of regulatory capital through roll-overs, concentration of

short-term borrowings and serious asset-liability mismatches, which could trigger systemic crisis and contagion in the domestic inter-bank market. It would also be very difficult to monitor and control the rollovers of short-term claims, given the high volume of transactions in the inter-bank market.

RBI Comment

RBI, therefore, reiterates that preferential risk weights should not be linked to the maturity of the claims.

Banks are strongly regulated and supervised entities. Risks inherent in inter-bank exposures are not comparable to that of the corporates. There is, therefore, a need for a modified treatment for claims on banks. The Basel Committee has provided discretion to national supervisors in paragraph 28 to assign a lower risk weight to the exposures to the sovereign of incorporation, denominated in domestic currency and funded in that currency. A similar flexibility should be provided in respect of claims on banks as well under option 2.

RBI Comment

RBI, therefore, reiterates that on the lines of discretion provided in the case of claims on sovereigns, the national supervisors may be given discretion under option 2 to assign lower risk weight, to all claims on banks, which are denominated in domestic currency and funded in that currency, subject to a floor of 20%.

External Credit Assessments

The Committee has indicated that if banks are allowed to use unsolicited ratings in the same way as solicited ratings there may be the potential for ECAIs to use unsolicited ratings to put pressure on entities to obtain solicited ratings. Therefore the Committee has proposed that such behavior, when identified, should cause supervisors to consider whether to continue recognizing such ECAIs as eligible for capital adequacy purpose.

RBI Comment

RBI feels that it would be very difficult for the supervisors to take a view as to whether the ECAIs are using unsolicited ratings to put pressure on entities to obtain solicited ratings. Supervisors are neither equipped nor competent to identify such behavior of rating agencies.

RBI appreciates the Committee's efforts in evolving a range of risk-sensitive options for assessing capital for credit risk. However, the reliance on External Credit Assessment Institutions (ECAIs) under the Standardized Approach for assigning preferential risk weights may not be a better option. First, the credibility of the rating agencies is at stake and there is no system of accountability for sharp deterioration in the credit quality of rated entities immediately after assigning a rating. Secondly, their access to information, especially in the absence of transparency and good corporate governance principles is severely restricted; whereas, banks are privy to customer information and are less exposed to customer-related informational asymmetry. Thirdly, the population of rated entities, even in the advanced countries, and especially in the emerging markets, which have exposure to the banking system, is very few in number. Fourthly, the use of external credit rating agencies in the regulatory process may act as a disincentive for the banks to improve their credit risk rating systems.

It is appreciated that the expanded role envisioned for IRB Approach provides positive incentives to banks in improving their credit risk management techniques. However, the adoption of the IRB Approach, even under the foundation approach, requires considerable investments in IT/human resources and rigorous supervisory oversights. Thus, most of the banks may not be able to adopt, even in advanced markets, the IRB foundation approach and would initially adopt Standardized Approach.

With a view to encouraging the banks using Standardized Approach, to move over to the IRB Approach at the earliest and also to equip them during the interregnum to adopt robust internal rating systems, they may be allowed to use the internal ratings for assigning preferential risk weights, on certain types of exposures, subject to compliance with the minimum standards prescribed by the Basel Committee for internal ratings under the IRB Approach.

This could be gradually extended to a larger portion of the banks' asset portfolio. This will encourage banks to refine their credit risk assessment and monitoring process, which would facilitate better management of their asset portfolio. This will also avoid the use of ECAIs in the regulatory process and reduce the burden of additional cost on this count. Besides, the scarce supervisory resources will be optimally utilized for validating the banks' internal rating systems rather than for approving ECAIs. This would also avoid conflict of jurisdiction over rating agencies.

RBI Comment

RBI, therefore, feels that while the internationally active banks in emerging economies may be initially required to follow the Standardized Approach, they may be allowed to use the internal ratings for assigning preferential risk weights, on certain types of exposures, after validation of the internal rating systems by the national supervisors.

Internal Rating Based Approach

RBI appreciates the Basel Committee's proposal to offer a range of options of increasing sophistication for providing explicit capital charge for credit risk. RBI recognizes the inherent attractiveness of the IRB Approaches, which will result in better internal credit risk management. However, the minimum requirements stipulated even under the IRB foundation approach are difficult to be implemented, especially in the emerging markets. Most of the banks do not have robust rating systems and historical data on Probability of Default (PD), nor do the supervisory authorities maintain time series data for estimating Loss Given Default (LGD).

It is well recognized that the proposal to assign banking book exposures into six broad classes of exposures with different underlying credit risk characteristics – corporates, sovereigns, banks, retail, project finance and equity under IRB Approach would better discriminate the likely pattern of portfolio losses. However, a common framework for definition of these segments, without recognizing the institutional framework, value of accounts or geographical spread, may pose severe implementation problems to banks in emerging markets.

RBI Comment

RBI, therefore, re-iterates that national supervisors may have discretion and flexibility in defining the exposure classes, such as corporate, retail, sovereign and project finance.

Operational Risk

In the context of increasing globalization, enhanced use of technology, product innovations and growing complexity in operations, RBI agrees, in principle, with the Committee's proposal to assign explicit capital charge for operational risk. RBI also acknowledges that the range of approaches of increasing sophistication – Basic Indicator, Standardized and Advanced Measurement – would set the basic framework for estimating capital for operational risk. Given the sophistication and database required for Standardized and Advanced Measurement Approaches, most of the banks, especially those domiciled in emerging markets would be adopting the Basic Indicator Approach.

The Committee has proposed that at national discretion banks can use Alternative Standardized Approach (ASA) for calculating operational risk capital charges (footnote 91, paragraph 615). This would serve as an intermediate stage for banks

which are migrating from the Basic Indicator Approach to the Standardized Approach. It is observed that under the ASA, the beta will be 15% for retail and commercial banking if they are aggregated and the banks unable to disaggregate their gross income into the other six business lines can aggregate the total gross income for these six business lines using a beta of 18%. This suggests adoption of a higher beta under the ASA as compared to the beta applicable to the Basic Indicator Approach which is 15% and may not, therefore, effectively serve the intended purpose of serving as an intermediate stage for banks migrating from the Basic Indicator Approach to the Standardized Approach.

RBI Comment

RBI, therefore, is of the opinion that the Committee may review the beta applicable to the various lines of business under the ASA, especially when the banks are not able to disaggregate their income for some of the lines of business and keep the effective capital charge under the ASA at a stage between that required under the Basic Indicator Approach and the Standardized Approach.

It has been proposed that, under the Alternative Standardized Approach the exposure indicator for 'retail banking' and 'commercial banking' business lines may be the 'volume of advances multiplied by m (which is 0.035)' instead of 'gross income'. It is also proposed that loans and advances for the purpose would be taken gross of provisions. Since this measure is intended to serve as an alternative to the measurement of gross income of these two business lines, it would be in order to reckon the advances 'net of non-performing loans' under the Alternative Standardized Approach.

RBI Comment

RBI is of the view that the proposal to alternatively consider volume of advances (instead of gross income) would imply a substantial increase in capital charge for operational risk. Hence, *RBI* feels that the volume of performing advances may be considered under the Alternative Standardized Approach.

Approach of RBI for Implementation of BASEL II - Specific Comments of RBI

International lending to developing and emerging economies

Under the CP 3, banks have the choice to adopt any one of the following methods for measuring credit risk:

- Standardized Approach (SA)
- Foundation Internal Ratings Based Approach (FIRB)
- Advanced Internal Ratings Based Approach (AIRB).

Under the SA, the risk weight for sovereign exposures would depend upon the rating assigned to such sovereign exposures by export credit agencies. Under the IRB (Internal Ratings Based) Approaches, the risk weight would depend upon the rating by the banks' internal ratings model and is computed as a function of the following four factors – probability of default, loss given the default, exposure at default and maturity. While the risk weight for exposures with the lowest rating (Below B-) under the SA is 150%, the same is likely to theoretically go up to 1250% under the IRB Approaches. This clearly illustrates the extent to which the IRB Approaches are more risk sensitive than the Standardized Approach.

It is unlikely that a developing economy would receive the best of the ratings. It is also largely unlikely that an entity in a developing economy would attract a rating better than the sovereign rating of that economy. In the circumstances, a bank adopting the IRB Approach is likely to be more averse to exposures to developing economies both directly (to the sovereign) and indirectly (to entities in that economy). As has been brought out convincingly in the paper 'Basel II and Developing Countries: Diversification & Portfolio effects' by Stephany

Griffith-Jones, Miguel Angel Segoviano and Stepphan Spratt – this aversion may translate into either avoidance of risk or appropriate pricing of the risk resulting in the following scenario * :

RBI Comment

Widespread adoption of the IRB Approach by internationally active banks would lead to a significant increase in capital requirements for loans to lower rated borrowers. To the extent that the pricing and availability of international bank loans is influenced by the capital requirements that relate to them, this would imply a sharp increase in the cost and/or reduction in the quantity of international lending to developing and emerging economies. The expressed purpose of the Basle II norms is to better align regulatory capital with actual risk. Therefore, failure of the proposals to take account of the benefits of international diversification suggests that, risk has not been measured accurately. By excluding the possibility that banks' capital requirements should take account of portfolio and diversification effects, the proposals effectively impose an inaccurate measure of risk, at the portfolio level. The fact that the proposals under Basle II will not allow these diversification benefits to be taken into account, suggests that the regulatory capital associated with lending to developing countries will be higher than that which the banks would – and currently are – choosing to put aside on the basis of their own models.

The BCBS has modified the IRB formula to take account of variable asset correlation as related to Probability of default, and those relating to the SMEs. Under the proposed treatment, exposures to SMEs will be able to receive a lower capital requirement than exposures to larger firms. The reduction in the required amount of capital will be as high as twenty percent depending on the size of the borrower, and should result in an average reduction of approximately ten percent across the entire set of SME borrowers in the IRB framework for corporate loans. Since the BCBS has recognized the impact that differential asset correlation can have on the portfolio level risk, there is a strong need that a similar modification is justified with respect to internationally diversified lending.

RBI is of the view that there is a strong case for revisiting the risk weights assigned to sovereign exposures when the exposures are aggregated as a portfolio which enjoy the benefits of diversification similar to the approach adopted for retail exposures.

Trading Book Issues

The Basel Committee has indicated that the changes made in the trading book are consistent with the changes in the banking book capital requirements under the Standardized Approach. However, the Committee's proposal to provide explicit capital charge on the basis of ratings is not consistent with the banking book capital requirements in respect 'other category' which attracts a uniform capital charge of 8% (risk weight of 100%) and does not compare with the risk weight of 150% being proposed for claims on sovereigns, banks and corporates that are rated below B–. Unless, the capital charge or risk weights are uniform both in the trading and banking books, the New Accord may lead to banks resorting to regulatory arbitrage.

RBI Comment

RBI, therefore, reiterates that the capital charge for specific risk in the banking and trading books should be consistent to avoid regulatory arbitrages.

Market Discipline - Third Pillar

RBI shares the Committee's view that market discipline can contribute to a safe and sound banking environment. RBI also shares the Committee's view that too much information could blur the key signals to the market and agrees with the proposal to make a clear distinction between core and supplementary disclosures. Further, the proposals to mandate frequent disclosures on information, subject to rapid time decay, would facilitate market participants in taking informed decisions.

General Issues

Impact on Capital under Standardized Approach

The Committee's views are apparently based on the assumption that capital discharge would be available on assigning preferential risk weights to claims on sovereigns, banks and corporates, on the basis of external assessments and recognition of more collaterals under credit risk mitigation techniques.

However, RBI feels that the adoption of the New Accord would definitely enhance the minimum regulatory capital, especially for banks domiciled in emerging markets on account of the following:

- All claims on sovereign in India are currently assigned a uniform risk weight of 0%. The discretion to assign a lower risk weight would henceforth be available to claims on sovereign (or Central Bank) of incorporation, denominated in domestic currency and funded in that currency. Other sovereigns are required to be assigned risk weight in the range of 0% to 150% on the basis of external assessments;
- Similarly, under the Current Accord, all claims on banks are assigned a uniform risk weight of 20%. The 20% risk weight would become the floor under the proposed accord. Since most of the banks are not rated they would have to be assigned a risk weight of 50%;
- The population of rated corporates is very small and hence most of them would have to be assigned a risk weight of 100%. The benefit of lower risk weight of 20% and 50% would, therefore, be available only to very few corporates;
- iv. Past due loans, net of specific provisions, would have to assigned a risk weight of 150% if the specific provisions are less than 20% of the outstanding amount of the loan if it is not fully secured or 15% of the outstanding amount of the loan if it is fully secured;
- Claims on certain high-risk exposures viz. venture capital and private equity, at national discretion, are also required to be assigned a higher risk weight of 150%;
- vi. The deduction of significant investments in commercial entities; and
- vii. Explicit capital charge requirement for operational risk.

The benefit of credit risk mitigation techniques also may not be available as most of the banks in emerging markets are not in a position to comply with the preconditions stipulated by the Basel Committee. These apprehensions were confirmed by the findings of the QIS 3 conducted by the Committee.

RBI Comment

The RBI therefore reiterates that unless suitably modified, the adoption of the New Accord in its present format would result in significant increase in the capital charge for banks, especially in emerging markets.

Program of Further Steps by RBI towards Implementation

The Reserve Bank of India (RBI) has decided to convene a meeting of banks before this year-end to assess implications of implementing of the New Basel Capital Accord (Basel II) by 2006-07. Although the Basel document is still not final, the basic architecture is now set and the Reserve Bank of India (RBI) in consultation with banks will evaluate the new framework and plan for the transition of Indian banks to Basel II. The timing, approach, and sequencing of Basel II, which seeks to align capital requirements of banks with their actual risks, will have to be closely tailored to Indian circumstances. The reservations, if any,

of RBI are based on the fact that Indian banks do not have the support of sophisticated MIS/data processing capabilities that can measure risks. Our Banks do not have robust rating systems and historical data on probability of default. Nor do the supervisory authorities maintain time series data for estimating loss given default to implement the foundation of Internal Ratings Based (IRB) approach. The complexity and sophistication essential for banks for implementing Basel II restricts its universal application in the emerging markets. In regard to the standardized approach, which builds on the existing Basel I, RBI's concerns are in regard to the use of external credit rating agencies.

[Source: Press Interview by RBI Executive Director Ms.Shyamala Gopinath.]

Commenting on the problem faced by the Banks in India, The Economic Times in an article titled "Moving in tandem" in its online issue dated Wednesday, June 18, 2003 observes that "There are 105 banks in the country with 55,000 branches – a majority of the public sector banks lack data due to late computerization. At the outset then, this means huge scale IT investments are being made to have the one critical element to implement Basel II successfully: Clean and reliable data – data that is accountable.

"Take for example credit risk – according to the New Basel Capital Accord, internal ratings must be 'grounded in the banks historical experience and empirical evidence'. This follows from the fact that data analysis and statistical modelling are the fundamental basis of any internal rating system – wherein the bank's own default and loss experience is the essential data source for the creation of the rating model.

"At this point, it is important to note that as per the Accord, even though the use of pooled data and mapping of internal rating grades to external data sources are explicitly allowed by the Accord, it is also stated that internal data must always be used, at least to complement these techniques. This is because a rating model that is built on internal data using internal resources is likely to be the superior choice for an internal rating system in most circumstances. It would optimally support banks in generation of disclosure reports, aggregation and decomposition of risk measures, generation of migration matrices, conducting vintage analysis for tracking realized default rates, quality control, rating system monitoring and assessing the model validity.

"More importantly, it establishes a solid foundation for a path towards Risk Adjusted Performance Management from a strategy perspective. Thus, on an immediate basis, banks need to collect and store a minimum of 3-5 years worth of historical data, ensure data integrity and timeliness of figures, effectively integrate different risk types and guarantee accurate calculation of risk measures."

Focussing the problem faced by Indian Banks from a different perspective, Business Line, Financial Daily from Chennai in its online edition dated Wednesday, December 12, 2002 observes as under

THE much-publicized and oft-debated Basel-II Capital accord has faced growing opposition and provoked concerns over issues such as systemic risk owing to "model-convergence" and "pro-cyclical lending". Notwithstanding these criticisms, the inordinate delays and inherent complexities of the proposals, major international banks have already started preparing the roadmap for taking full advantage of the new Basel-II regime. Most banks in India and other developing countries will face stiff competition from these large banks, as the opening up of the banking sector under WTO's General Agreement on Trade in Services (GATS) and the rolling out of Basel-II will be more or less coincidental and also because the business implications of the two are complementary in nature.

The Internal Ratings Based (IRB) approach proposed by the Basel Committee on Banking Supervision seeks to make bank regulatory capital requirements for credit risk approximate the economic capital requirements. The new accord provides for a win-win situation for mostly large and sophisticated global banks. These banks will be able to function at the lower capital requirements at transaction levels and "cherry pick" the best of deals by aggressive pricing. This is particularly true for acquiring AAA type of assets, as these banks will be able to release substantial capital by using sophisticated risk measurement techniques in their IRB models.

On the other hand, small banks, particularly those outside G10, will be able to apply only simple risk measurement (or standardized) approaches. These banks will have a difficult time competing with their big and sophisticated counterparts, as the regulatory capital requirements for them will be far more than the economic capital they actually need and this regulatory overhead will prove to be a major cause of inefficiency. Unable to compete for quality assets in a market where banks are already price takers, these banks will be left with the lower bands of the rating spectrum. Which means a riskier balance-sheet, lower credit rating and higher cost of liabilities. The weak getting weaker in a vicious cycle.

Economic Capital Based (ECB) models help banks in capital budgeting, deal pricing and performance measurement in a "risk-adjusted" framework. As against the traditional financial performance measure of absolute returns, banks can now evaluate performance across the business units using the same performance measure: Risk-adjusted returns. Two businesses that make the same amount of money may involve very different amounts of risk and, hence, economic capital. A bank may accordingly decide the capital allocation and form a business strategy with a target risk-return profile, which then gets reflected in its credit rating and share price."

To introduce economic capital models, banks will need to understand two elements of economic capital assessment. The first is calculating aggregate economic capital across all sources of risk (simultaneously capturing the underlying diversification that exists among them). The second is allocating that capital to individual business units or profit centers on a risk-efficient basis. Banks must realize that models based on economic capital framework will help in riskadjusted capital allocation, risk-adjusted pricing and risk-adjusted performance measurement. Moreover, pillar three of the new Basel accord aims at setting a framework for bolstering market discipline, allowing shareholders to see their risk profile."

"Although the time line for Basel implementation seems to be far off (around 2006) and many areas of the accord have not yet been finalized, it will be prudent for banks in developing countries and local regulators to start initial work. The RBI has already communicated to commercial banks under its jurisdiction that they may upgrade their credit-risk management systems for optimizing capital if they wished to take advantage of inbuilt capital incentives available under the IRB models in the new accord.

"There is no doubt that most banks will benefit from the economic capital framework, which is in line with Basel-II discussions and proceedings and modern financial academics. It will provide them with a platform to develop models for managing their businesses efficiently and to compete with the large sophisticated players. It will also help them learn how to use their capital in the most efficient manner, which will be the key to survival in a global, unconstrained and ruthless market in financial services.

"Those banks which develop expertise as well as global standards of risk measurement and analysis, reporting and disclosure now will benefit from improved IRB models and find themselves equipped to face the "activist investor". Those who do not, will be targets for increased consolidation in this capital-starved sector. Some will be purchased and some will go bankrupt, unless there is a bailout package in the offing from taxpayers."

"Basel II represents a logical and appropriate successor to Basel I. Its basic message is that all parts of the international financial system – banks, supervisors and other market participants – can and must become more discriminating in their approaches to risk, and better equipped to anticipate problems before they turn into crisis. The events of the past few years in industrialized as well as developing economies have forcefully driven this lesson home to banks and supervisors alike.

Basel II thus reflects both the lessons of the recent past and the direction in which private and official sectors must continue to move.

"It is a major, ambitious, and difficult effort, very much a work-in-progress. And it is in all our interests to continue improving it and help make it succeed."

Before beneficial implementation of Basel II standards accompanied by expert risk-management techniques suited to reap the optimum advantage of capital usage, Indian Banks need to implement total IT usage in their functioning and operations with inter-connectivity of their branches and administrative offices along with re-engineering of their functional systems and business process, as also human resource development policies at par with global standards. This process started with the Banking Sector Reforms in 1992, but subsequently there is so-down in recent years. But when the transformation in all above mentioned areas comes through, Indian Banking can achive not only global standards but global leadership, together possessing knowledge superiority and cost advantage. Basel II is thus a challenge as well as an opportunity.

Glossary

Absolute Risk	:	Pure risk without the mitigating effects of Internal Controls. See also Managed Risk.
Accepting Risk	:	A Risk Management technique that allows management to weigh the cost of managing the risk versus the benefits of reducing the risk.
Accrual Bond	:	A type of CMO bond, also called a Z bond.
ALM	:	Asset-Liability Management.
ALCO	:	Is the acronym for Asset and Liability Committee. Term used frequently in banking industry.
Alternative Option	:	A better-of option.
American Exercise	:	A provision that permits exercise of an option any time prior to expiration.
Annualized Return	:	A return calculated over one period, but adjusted to be comparable to a return calculated over a year.
Annualized Volatility	:	A quoting convention for volatility.
Antithetic Variates	:	A technique of variance reduction for the Monte Carlo method.
Appetite for Risk	:	A measure of the propensity for Risk Taking or Risk Aversion.
Arbitrage	:	i. A transaction which generates a risk-free profit; or
		ii. The activity of engaging in arbitrage transactions.
Arbitrage	:	A strategy that tries to take advantage of small pricing differences for the same financial instrument in different markets. Arbitrage is also used as a term for the amount of difference from pricing Parity. In an efficient market, there are no opportunities for arbitrage.
Arbitrage CDO	:	A Collateralized Debt Obligation (CDO) sponsored for the purpose of adding value by repackaging collateral.
Arbitrage Condition	:	Any relationship that must prevail between certain prices if they are to be arbitrage-free.
Arbitrage-Free Model	:	A type of financial model which generates market scenarios which entail no arbitrage opportunities.
Arbitrage-Free Pricing	:	The approach to pricing instruments that underlies essentially all of financial engineering.
Arbitrageur	:	One who engages in arbitrage.
ARCH	:	Auto Regressive Conditional Heteroskedasticity
Arithmetic Return	:	Simple return.
Arthur Andersen Conviction	:	In 2002, accounting firm Arthur Andersen was convicted on a single charge related to its auditing of Enron.

Asian Option	:	An option whose expiration value depends on the average value of an underlier over a specified period.
Asset-Backed Security	:	A securitized interest in non-mortgage assets.
Asset-Based Lending	:	Collateralized lending.
Asset-Liability Management	:	A risk management technique for protecting an institution's capital.
Asset-Liability Risk	:	Risk to a firm from having assets and liabilities whose risk exposures do not offset one another.
Asset-or-nothing Binary	:	A type of binary option.
Asset Value Model	:	A type of default model.
Assurance	:	A system of Corporate Governance that provides feedback on the efficiency and effectiveness of operations, compliance with laws and regulations, and accuracy and reliability of financial information. Both Internal Audit and Risk Management are part of the assurance process.
At-the-Money	:	A condition where, the value of an option's underlier equals the option's strike price.
Auto-correlation	:	A correlation between a component of a stochastic process and itself lagged a certain period of time.
Auto-Regressive Conditional Heteroskedasticity (ARCH)	:	A category of models for conditionally heteroskedastic processes.
Average Option	:	An Asian option.
Average Price Option	:	An average rate option.
Average Rate Option	:	A form of Asian option whose pay-off is linked to the average underlier value over a specified period.
Average Strike Option	:	A form of Asian option whose strike equals the average underlier value over a specified period.
Avoiding Risk	:	A Risk Management technique of redesigning the task to deal with a different set of risks (usually lower). Not to be confused with eliminating Risk.
Backwardation	:	A condition where spot prices exceed forward prices.
Balance Sheet CDO	:	A CDO issued for the purpose of moving assets off the sponsor's balance sheet.
Banking Act of 1933	:	The United States Glass-Steagal Act, that separated commercial and investment banking and formed the FDIC.

Bank for International Settlements	:	An international organization which fosters international monetary and financial co-operation and serves as a bank for central banks.	
Barings Debacle	:	In February 1995, Britain's Barings bank was bankrupted by a single trader making unauthorized trades out of a Singapore office.	
Barrier Option	:	A path-dependent option that terminates or is activated by the underlier reaching some "barrier" level.	
Base Currency	:	The currency in which a VaR measure quantifies market risk.	
Basis	:	The spread between a futures price and the spot price of the underlier.	
Basis Risk	:	i. Market risk from exposure to a futures basis.	
		ii. The uncertainty about the basis at the time a hedge may be lifted.	
Basket Option	:	An option on a portfolio or "basket" of underliers.	
Basle II	:	An international accord on bank capital requirements to replace the earlier 1988 Basle Accord.	
Basle Accord (1988)	:	An international accord on bank capital requirements.	
Basle Accord (1996 Amendment)	:	An amendment to the 1988 Basle Accord that added capital requirements for market risk.	
Basle Committee	:	An international committee that has played a leading role in standardizing bank regulations across jurisdictions.	
Behavioral Risk Assessment	:	The assessment of risk to an organization as a result of examining its culture, structure, employee attitudes, and mechanisms to relieve employees of stress.	
Bermudan Exercise	:	A provision that permits exercise of an option on any of several days prior to expiration.	
Beta	:	A measure of systematic risk.	
Bid-ask Spread	:	The difference between prices at which dealers are willing to buy or sell.	
Bilateral Netting	:	i. Netting of obligations between two parties.	
		ii. A legally enforceable arrangement between a bank and a counter party that creates a single legal obligation covering all included individual contracts. This means that a bank's obligation, in the event of the default or insolvency of one of the parties, would be the net sum of all positive and negative fair values of contracts included in the bilateral netting arrangement.	
Binary Option	:	A type of option which features a discontinuous expiration value.	
BIS	:	Bank for International Settlements.	
Black (1976) Option Pricing Formula	:	A pricing formula for European options on commodities, forwards or futures.	

Black-Scholes (1973) Option Pricing Formula	:	The original option pricing formula published by Black and Scholes in their landmark (1973) paper. Used to price European options on non-dividend-paying stocks.
Black-Scholes Theory	:	Another name for option pricing theory.
Boesky Day	:	November 14, 1986, the day it was announced that Ivan Boesky had pled guilty to insider trading and was co-operating with government investigators.
Boesky, Ivan	:	An insider trader of the 1980s.
Book Value	:	Acquisition cost less depreciation.
Bond Investment Risk	:	The risk of fixed income investing. Although these risks include short-term and prolonged price declines, such price declines in the bond market have historically been less severe than stock declines.
Brainstorming	:	A Strategic Planning process and Risk Assessment tool that attempts to unlock the imagination of a group by stimulating a "storm" of ideas through a structured process.
Bull Spread	:	A call spread.
Business Risk	:	Exposure to uncertainty in economic value that cannot be marked-to-market.
Call	:	An option to purchase an asset.
Call Spread	:	An options spread comprising a long-short position in call options.
Callable Bond	:	A bond which allows the issuer to repurchase the bond for a specified price on certain dates prior to the bond's maturity.
Сар	:	A type of derivative instrument that offers protection against rising interest rates.
Captive	:	The term for an insurance company that is owned by the company it insures. It is a Risk Financing strategy to lower the cost of insuring Risk.
Capacity to Contract	:	Legal authority to enter into a given contract.
Capital Allocation	:	A process of choosing what ventures, deals or trades to engage in, usually based upon some cost or risk-return analysis.
Capital Adequacy	:	 i. A risk management concept which requires that the capital of a financial organization be sufficient to protect its counterparties and depositors from on- and off-balance sheet market risks, credit risk, etc. Capital requirements are often simple mechanical rules, but are growing to be more sophisticated risk management technology. The test of a securities business's ability to meet its financial obligation.
		 Capital adequacy rules outline the money that is necessary to support the risks of trading; the possibility of reduced revenue from weak trading conditions; the danger that book debts may not be fully realized, etc.

Capital Asset Pricing Model	:	A model for valuing financial assets based upon their systematic risk.
Capital Market Line	:	A line which describes the optimal relationship between risk and reward for an investment portfolio.
САРМ	:	Capital Asset Pricing Model.
Cartwheel	:	An options spread that is long (short) a ratio call spread and short (long) a ratio put spread.
Cash CDO	:	A CDO whose collateral comprises cash positions in bonds, loans or other forms of debt.
Cash Flow CDO	:	A CDO whose payments to investors are contingent on the adequacy of collateral cash flow.
Cash Instrument	:	An instrument whose value, unlike that of a derivative instrument, is determined directly by the markets.
Cash Price	:	The price at which trades for cash settlement transact.
Cash Trade	:	A trade that settles on the trade date.
Cash-or-nothing Binary	:	A type of binary option.
Cash Settlement	:	i. In trading, settlement on the trade date – see settlement.
		ii. A derivative instrument has cash settlement if it settles for a cash payment in lieu of physical delivery of an underlier – see physical settlement, cash settlement.
СВО	:	Collateralized Bond Obligation.
CFTC	:	Commodity Futures Trading Commission.
Chi-squared Distribution	:	A continuous probability distribution related to the normal distribution.
Chief Risk Officer	:	Head of Risk Management.
Chooser Option	:	A derivative that converts to a vanilla put or a vanilla call at the holder's choice.
Citron, Robert	:	Treasurer of Orange County, California whose speculative activities lead to the county's 1994 bankruptcy.
Cliquet Option	:	A ratchet option.
CLO	:	Collateralized Loan Obligation. See CDO.
Closed form VaR	:	Linear VaR.
Close-out Netting	:	The netting of obligations on derivative instruments that are terminated early. In the event of counterparty bankruptcy, all transactions or all of a given type are netted at market value. The alternative would allow the liquidator to choose which contracts to enforce and which not to (and thus potentially "cherry pick"). There are international jurisdictions where the enforceability of netting in bankruptcy has not been legally tested.

Collar	:	An options spread comprising a long-call and short-put.
Collateral	:	 i. Assets held to secure an obligation. ii. An Obligation or security linked to another obligation or security to secure its performance. For example, an option writer may deposit with his bank or broker common stock in the company on which an option is written as collateral to guarantee performance on the option. He may also deposit securities convertible into the underlying stock or completely unrelated securities with an appropriate market value. Collateral is also posted as a performance bond to guarantee performance on listed futures contracts and on various Over-the-Counter contracts.
Collateral Arrangement	:	An agreement between two parties for the ongoing collateralization of a REPO securities lending, derivative or other transaction.
Collateralized Bond Obligation	:	A securitized interest in a portfolio of bonds.
Collateral Security	:	This is extra security provided by a borrower to back-up his/her intention to repay a loan. Such security might be: Cash/Marketable Securities, Inventory, Accounts Receivable, Fixed Assets or Real Estate. It would likely include documentation (such as deeds) giving right of title to property, which the lender could take over and sell to repay the debt if the borrower defaults.
Collateralized Debt Obligation	:	A securitized interest in a portfolio of bonds, loans or other debt.
Collateralized Loan Obligation	:	A securitized interest in a portfolio of loans.
Collateralized Mortgage Obligation	:	A type of Mortgage-Backed Security.
Commercial Bank	:	A type of bank defined by US law that engages in lending and deposit taking businesses.
Compression Risk	:	The potential loss from a decline in yields that triggers call features on corporate debt or prepayment on mortgaged debt, and causes an issue to behave like a short-term note. A function of prepayment opportunities and incentives.
Commodity Futures Modernization Act	:	US legislation passed in 2000 clarifying that OTC (Over-the-Counter) derivatives markets were to remain largely unregulated.
Commodity Futures Trading Commission	:	The regulator of futures and options exchanges in the United States.
Companion Bond	:	A bond that takes most of the prepayment in a PAC CMO structure.
Compound Interest	:	A method of crediting interest in which interest is earned on interest.
Compound Option	:	An option on an option.

Conditional Heteroskedasticity	:	A condition where a stochastic process has non-constant conditional second moments.
Conditional Homoskedasticity	:	A condition where a stochastic process has constant conditional second moments.
Conditional Prepayment Rate	:	A metric of annual prepayment for Mortgage-Backed Securities.
Confidence Dispersion	:	The measure of Uncertainty about an estimate. In auditing, it has been used as a measure of uncertainty about Control Risk due to the passage of time between audits. The longer the time, the greater the risk (or greater dispersion of confidence in control effectiveness).
Contango Containment	:	A condition, where, forward prices exceed spot prices. The Risk Management strategy that attempts to limit the negative Consequences of a Risk Event. This strategy can include Internal Controls and/or Contingency Planning.
Contingent Premium Option	:	An option for which the premium is deferred to expiration and is paid only if the option expires in-the-money.
Continuous Compound Interest	:	A limiting form of compound interest, where, the frequency with which interest is credited approaches infinity.
Continuous Process	:	A stochastic process that has a term associated with every real number.
Contract Formation	:	Steps through which a legally enforceable contract is entered into.
Contract Frustration	:	Invalidation of a contract by unforeseen circumstances.
Control Variates	:	A technique of variance reduction for the Monte Carlo method.
Control and Risk Self-Assessment	:	Abbreviated CRSA; See Control Self-Assessment.
Control Self- Assessment	:	Abbreviated CSA. A class of techniques used in an audit or in place of an audit to assess risk and control strength and weaknesses against a Control Framework. The "self" assessment refers to the involvement of management and staff in the assessment process, often facilitated by internal auditors. CSA techniques can include workshop/seminars, Focus Groups, Structured Interviews, and survey questionnaires.
Control Risk	:	The tendency of the Internal Control system to lose effectiveness over time and to expose, or fail to prevent exposure of, the assets under control.
Controls Evaluation Tables	:	A Risk Analysis technique that focuses on the strengths of Internal Controls to mitigate the risks. The analysis is performed using a tabular representation of the risks vs. controls and a measure of the control strength.
Convexity	:	A factor sensitivities indicating a fixed income portfolio's second order (quadratic) sensitivity to the parallel shifts in the spot cure.

Correlation	:	A parameter, related to covariance, that indicates the tendency for two random variables to "move together" of "co-vary."
Correlation Matrix	:	A symmetric matrix indicating all the correlations of a random vector.
Cost, Insurance, Freight	:	A method for settling physical commodity trades.
Cost of Funds Index	:	A yield index.
Costless Collar	:	A collar whose strike prices are set so that the net cost of the collar is zero.
Cost/Benefit Analysis	:	A Risk Management tool used to make decisions about Accepting Risk or using some other risk management technique.
Coupon Leverages	:	The amount by which the reference rate is multiplied to determine the floating rate payable by an inverse floater.
Country Risk	:	This risk deals with government intervention or otherwise, central bank intervention excepted. Examples include war, the freezing of foreign funds, political pressures on the banking system, etc.
Covariance	:	A parameter, related to correlation, that indicates the tendency for two random variables to "move together" of "co-vary."
Covariance Matrix	:	A symmetric matrix indicating all the covariances and variances of a random vector.
Covariance Stationarity	:	A property of some stochastic processes.
CPR	:	Conditional Prepayment Rate.
Crack Spread	:	A spread between crude and refined oil prices.
Crash of 1929	:	A famous stock market crash.
Credit	:	A counterparty that poses credit risk.
Credit Analysis	:	Any process for assessing the credit quality of a counterparty.
Credit Analyst	:	A professional who performs credit analysis.
Credit Default Swap	:	A type of credit derivative. A Swap in which A pays B the periodic fee, and B pays A the floating payment that depends on whether a predefined credit even has occurred, or not. The fee might be quarterly, semiannual, or annual. The floating payment would likely occur only once, and might be proportional to the discount of the reference loan below par. The credit event might be a declaration of bankruptcy or violation of a bond indenture or loan agreement.
Credit Derivative	:	A derivative instrument designed to transfer credit risk from one party to another.
Credit Distress	:	A firm can have many types of credit obligations outstanding. These may be of all manner of seniority, security and instrument type. In bankruptcy proceeding, it is not uncommon for different obligations to realize different recovery rates including perhaps 100% recovery – zero loss. It is the obligor that encounters credit distress carrying all of his obligations with him. Thus, individual obligations will be exposed to credit distress even though some may not realize an actual default (i.e., some may have zero loss).
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Credit Enhancement	:	Any methodology that reduces the credit risk of a transaction with a counterparty.
Credit Exposure	:	The potential for loss in the event of a default.
Credit Insurance	:	A form of insurance designed to protect against default by a debtor.
Credit Linked Note	:	A type of credit derivative.
Credit Quality	:	Encompasses both the likelihood of a counterparty defaulting as well as possible recovery rates in the event of a default.
Credit Rating	:	An metric of the credit quality of either a counterparty or a specific obligating of a counterparty.
Credit Risk	:	Risk due to uncertainty in a counterparty's ability to meet its obligations.
Credit Scoring	:	A formulaic procedure for assessing credit quality.
Credit Spread	:	A yield or interest rate spread due to credit risk.
Credit Spread Swap	:	A Swap with a payoff that depends on a Credit Spread. For instance, a Swap with a Floating Leg that depends on the Credit Spread.
Cross Correlation	:	A correlation between one component of a stochastic process and another lagged by a certain period of time.
Crude Monte Carlo Estimator	:	A Monte Carlo estimator implemented without variance reduction.
Currency Risk	:	The price risk relating to exchange rate fluctuations.
Currency Code	:	Any three letter code used to designate a particular currency.
Curse of Dimensionality	:	A tendency of certain computational techniques for their computational expense to increase exponentially with the dimensionality of the problem to be solved.
Custodian	:	An institution that holds securities for investors.
Custody	:	The safekeeping of securities and related services.
Cylinder	:	A type of derivatives hedge.
Daiwa Bank Debacle	:	A 1995 rogue trader scandal.
Default Intensity	:	An "instantaneous" rate of default.
Default Mode	:	A mode of analysis for a portfolio credit risk model.

Default Model	:	A type of model that assess the likelihood of default by an obligor.
Delivery Month	:	For physically settled futures contracts, the month during which delivery occurs.
Delta	:	The Greek factor sensitivities measuring a portfolio's first order (linear) sensitivity to the value of an underlier.
Delta Approximation	:	A linear approximation for how a portfolio's value will change in response to a small change in an underlier's value.
Delta-Gamma Approximation	:	A quadratic approximation for how a portfolio's value will change in response to a small change in an underlier's value.
Delta-Gamma Remapping	:	A quadratic remapping constructed from a portfolio's Deltas and Gammas.
Delta-Gamma VaR Measure	:	Quadratic VaR measure.
Delta-Normal VaR	:	Linear VaR.
Depreciation	:	An amount deducted from an asset's book value to account for loss in value over time.
Derivatives	:	Financial instruments or contracts which are valued based on (derived from) the value of other financial instruments. This is a financial Risk Financing strategy. These financial instruments can be highly Leveraged and therefore highly Volatile. A common form of derivative is a foreign currency hedge contract to finance overseas trade: the purchase of an option to buy or sell a foreign currency at a certain date for a certain price. This Hedging example reduces the risk of future price fluctuations by trading an uncertain price in the future for a certain (guaranteed) price now, for a fee.
Derivatives Pricing Theory	:	The body of financial theory used by financial engineers to value derivative instruments.
Deterministic Volatility Function Model	:	Alternative name for a local volatility model.
Default Risk	:	Also referred to as credit risk (as gauged by commercial rating companies), the risk that an issuer of a bond may be unable to make timely principal and interest payments.
Differential Equations Approach	:	An informal name for derivatives pricing models based upon the original Black-Scholes methodology.
Differential Swap	:	Quanto swap.
Digital Option	:	Binary option.
Discount Curves	:	A graph of discount factors as a function of maturity.
Discount Factor	:	The factor by which a future cash flow must be multiplied in order to obtain its present value.
Discrete Process	:	A stochastic process that has terms associated with each integer.

Distance to Default	:	A metric of how close debt is to a defaulting.
Diversification	:	The taking of multiple disparate risks.
Diversify Risk	:	A Risk Management technique that seeks to spread the risk from a single task or asset to multiple tasks or assets so as to avoid losing everything at once.
Drexel Burnham Lambert	:	The investment bank that dominated the junk bond market of the 1980s.
Dual Remapping	:	A type of remapping used in Value-at-Risk measures.
Duration	:	A factor sensitivities indicating a fixed income portfolio's first order (linear) sensitivity to the parallel shifts in the spot cure.
Duration-Convexity Matching	:	A technique of asset-liability matching.
Dynamic Hedging	:	A strategy that involves rebalancing hedge positions as market conditions change; a strategy that seeks to insure the value of a portfolio using a synthetic put option.
Economic Capital	:	Capital employed in internal capital allocation as a proxy for a firm's ability to take risk in exposures.
Economic Exposure	:	This relates to changing exchange rates and its' affect on the cash flow and earning power of a corporation. Import/Export companies are particularly affected by economic exposure.
Efficient Frontier	:	A theoretical set of portfolios offering optimal risk-reward tradeoffs.
Enron Debacle	:	In December 2001, energy trading powerhouse Enron filed for bankruptcy in the midst of an accounting scandal.
Environmental Approach	:	The approach to Risk Assessment from the perspective of the external Environment.
Equilibrium Market Price of Risk	:	The slope of the Capital Market Line (CML). Since the CML represents the return offered to compensate for a perceived level of risk, each point on the line is a balanced market condition, or equilibrium. The slope of the line determines the additional return needed to compensate for a unit change in risk.
Enterprise Risk Management	:	The extension of financial risk management to non-financial risks.
Euro Interbank Offered Rate	:	Refers to indicative short-term interest rates available for the Euro.
European Exercise	:	A provision that permits exercise of an option only at expiration.
European Financial Regulation	:	Linked article provides an overview.
Event Risk	:	The risk that the ability of an issuer to make interest and principal payments will change because of
		i. A natural or industrial accident or some regulatory change or
		ii. A takeover or corporate restructuring.

Event Trees	:	A method of Risk Identification and Consequence evaluation where all possible subsequent events are evaluated for their Risk. Used in Risk Scenarios.
Ex-Dock	:	A method for settling physical commodity trades.
Exchange for Physicals	:	An alternative to physical settlement offered by many futures exchanges.
Exchange Traded	:	Traded on a formal exchange such as the New York Stock Exchange or Chicago Board of Trade.
Exchange Rate Risk	:	Deals with the risk associated with the spot price. It is affected by the supply and demand of foreign exchange worldwide.
Exempt Security	:	A security exempted from certain provisions of US securities laws.
Expected Default Frequency	:	Default probability calculated for a one-year horizon.
Exotic Derivative	:	A complicated or specialized derivative instrument.
Expected Exposure	:	The expected value of credit exposure at some future point in time.
Expected Loss	:	Expected value of losses due to default over a specified horizon.
Expected Shortfall	:	Expected tail loss.
Expected Tail Loss	:	A VaR metric indicating the expected portfolio loss conditional on that loss exceeding a specified quantile of loss.
Expectation	:	Expected value.
Expected Value	:	i. A parameter indicating the "center of gravity" of a probability distribution.
		ii. The value of an option at expiration.
Expected Loss or Expected Value Approach	:	The evaluation of Risk based on the dollar variation that results as a Consequence to the risky Events.
Exposure at Default	:	Credit exposure to an obligor at the time of a default by that obligor.
Exposure Limit	:	A risk limit based upon some exposure metric of risk.
Exposure Approach	:	The approach to Risk Assessment from the perspective of the four classes of assets (physical, financial, human, intangible) and their size, type, portability, and location.
Extendible Option	:	An option whose expiration may be extended.
Fault Trees	:	A method of Risk Identification and Risk Scenario building, where, the end result of an event is traced backwards to all possible causes.
Federal Reserve	:	The central bank of the United States.
Fence	:	A collar.
Financial Engineer	:	A practitioner of financial engineering.

Financial Engineering	:	The field of applied finance devoted to the design and pricing of derivative instruments.
Financial Risk Management	:	Practices by which a firm optimizes the manner in which it takes financial risk.
Financial Services Modernization Act of 1999	:	The US legislation that revoked the Glass-Steagal separation of investment and commercial banking.
First Notice Date	:	The first date on which notice of delivery on a futures contract can be given to the exchange.
Fixed Income Term Structure	:	Refers collectively to a spot curve, forward curve, discount curve, yield curve or any other curve that describes the time value of money at a particulate point in time.
Fixed Strike Look Back Option	:	One of two basic forms of lookback options.
Floater	:	A fixed income instrument whose coupon fluctuates with some designated reference rate.
Floating Rate CMO	:	A CMO tranch structured as a floater.
Floating Rate Note	:	A floater issued by a corporate or agency borrower.
Floating Strike Lookback Option	:	One of two basic forms of lookback options.
Floor	:	A type of derivative instrument that offers protection against declining interest rates.
Flower Bond	:	A type of tax-advantaged bond issued by the US Treasury between 1953 and 1963.
Forward	:	Forward contract.
Forward Contract	:	A trade that settles on some date later than the spot settlement date.
Forward Curve	:	i. A graph of forward prices for different maturities;
		ii. A graph of forward interest rates for different forward periods.
Forward Loan	:	A loan that commences on some future (post spot) date.
Forward Price	:	The price at which trades for forward settlement transact.
Forward Rate	:	The interest rate payable on a forward loan that accumulates interest to maturity.
Forward Rate Agreement	:	A cash-settled forward contract on a short-term loan.
Forward Settlement	:	Trade settlement on some date subsequent to spot settlement.
Forward Start Option	:	An option purchased some time prior to its becoming active.
Forward Trade	:	A trade for settlement on some future (post spot) date.

Foreign Exchange Risk	:	Possible losses resulting from exchange rate movements. A foreign currency devaluation, for example, could result in losses on an overseas investment.
Fourier Transforms	:	An integral transform used in signal processing, physics and financial engineering.
FRA	:	Forward rate agreement.
Freddie Mac	:	Name for what was previously the Federal Home Loan Mortgage Corporation.
Freeman, Robert	:	Goldman Sachs arbitrager who became embroiled in the 1980's insider trading scandals.
FRN	:	Floating Rate Note.
Function Remapping	:	A type of remapping used in Value-at-Risk measures.
Future	:	An exchange-traded derivative, that is, similar to a forward.
Futures Spread	:	A long-short futures position.
Gamma	:	The Greek factor sensitivities measuring a portfolio's second order (quadratic) sensitivity to the value of an underlier.
GARP	:	Coopers and Lybrand's Generally Accepted Risk Principles for financial services institutions.
Garman and Kohlhager (1983) Option Pricing Formula	:	A formula for pricing European options on currencies.
Generalized ARCH	:	A generalization of the Auto-regressive Conditional Heteroskedasticity model.
Geometric Return	:	Log return.
Greeks	:	A set of factor sensitivities used for measuring risk exposures related to options or other derivatives.
Gross Return	:	Simple return plus 1.
Group of 30 Report	:	An influential 1993 industry report on OTC derivatives.
Hazard Rate	:	Default intensity.
Head of Risk Management	:	A senior manager with responsibility for financial risk management within a firm.
Hedging	:	i. The taking of offsetting risks.
		ii. Transactions to reduce the volatility in portfolio value. This is accomplished by taking the opposite side of ones' portfolio exposure similar to insurance. The instruments used are varied and include Forwards, Futures, Options, and combinations of all of them.

Herstatt Bank	: A German bank whose 1974 failure highlighted the dangers of settlement risk.
Herstatt Risk	: Settlement risk.
Heteroskedasticity	: A condition, where, a stochastic process has non-constant second moments.
High Yield Bond	: Junk bond.
Historical Transformation	: For a VaR measure, a transformation procedure that employs the Monte Carlo method with realizations constructed from historical market data.
Historical VaR	: A category of VaR measures that employ an historical transformation.
Historical Volatility	: A volatility estimated from historical data.
Holder Extendible Option	: An option that grants the holder the rights to extend the expiration date.
Holdings	: A row vector listing the number of units of specific assets held by a portfolio.
Holdings Remapping	: A type of portfolio remapping.
Homoskedasticity	: A condition, where, a stochastic process has constant second moments.
Hypothecation	: The posting of collateral.
Inflation Risk	The risk that the value of assets or income from investments will be
	less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline.
Implied Volatility	 Is the future of assess of meone from investments will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price.
Implied Volatility Implied Tree Model	 Ine first that the value of assess of meone from investments will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model.
Implied Volatility Implied Tree Model Importance Sampling	 Ine fish that the table of assess of meone from investments will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model. A technique of variance reduction for the Monte Carlo method.
Implied Volatility Implied Tree Model Importance Sampling In-the-money	 Ine finit that the table of assess of meone from integrations will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model. A technique of variance reduction for the Monte Carlo method. A condition, where, an option has a positive intrinsic value.
Implied Volatility Implied Tree Model Importance Sampling In-the-money In-warehouse	 Income that the tube of assess of meone from investments will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model. A technique of variance reduction for the Monte Carlo method. A condition, where, an option has a positive intrinsic value. A method for settling physical commodity trades.
Implied Volatility Implied Tree Model Importance Sampling In-the-money In-warehouse Independence	 Income that the table of absended means in the form integrations will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model. A technique of variance reduction for the Monte Carlo method. A condition, where, an option has a positive intrinsic value. A method for settling physical commodity trades. In the context of financial risk management, the segregation of risk management and risk taking functions.
Implied Volatility Implied Tree Model Importance Sampling In-the-money In-warehouse Independence Inherent Risk	 Income that the table of absended method method interesting with the less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. Alternative name for a local volatility model. A technique of variance reduction for the Monte Carlo method. A condition, where, an option has a positive intrinsic value. A method for settling physical commodity trades. In the context of financial risk management, the segregation of risk management and risk taking functions. The risk found in the environment and in human activities that is part of existence.
Implied Volatility Implied Tree Model Importance Sampling In-the-money In-warehouse Independence Inherent Risk Inference Procedure	 International that the value of absension meaning from investments will be less in the future as inflation decreases the value of money. As inflation increases, the value of a Fund's assets, and the value of the Fund's distributions, can decline. A volatility inferred from an option price. A technique of variance reduction for the Monte Carlo method. A condition, where, an option has a positive intrinsic value. A method for settling physical commodity trades. In the context of financial risk management, the segregation of risk management and risk taking functions. The risk found in the environment and in human activities that is part of existence. The procedure within a VaR measure that characterizes a joint probability distribution for key factors.

Intensity Model	:	A type of default model.
Intercommunity Spread	:	A futures spread, where, the contracts are for different underliers.
Interest Rate Risk	:	The potential impact on the bank's earnings and economic value due to changes in interest rates. Rising interest rates could, for example, increase funding costs and reduce the net interest margin earned on a fixed yield mortgage portfolio.
Interest Rate Cap	:	A derivative instrument, which is linked to interest rates.
Interest Rate Floor	:	A derivative instrument, which is linked to interest rates.
Interest Rate Swap	:	Used to alter the cash flow characteristics of an institution's assets so as to provide a better match with its liabilities.
Interest Rate Policy	:	An arbitrage condition that must hold between the spot interest rates of different currencies.
Interest Rate Spreads	:	Spreads between interest rates.
Internal Capital Allocation	:	A process intended to ensure that an organization engages in transactions that are – usually from a risk-return standpoint – most desirable.
Interpolation Remapping	:	A global remapping implemented using interpolation.
Integrated Risk Management	:	The consideration of Risk at all levels of the organization, from the Strategic to the day-to-day job of the customer-facing employee. Integrating risk management into internal auditing means adopting Risk-Based Auditing and using risk management tools to plan internal audits.
Intracommodity Spread	:	A futures spread where both futures are on the same underlier but have different maturities.
Intrinsic Value	:	The component of an option's market value that could be realized by exercising the option immediately.
Inverse Floater	:	A floater whose coupon varies inversely to its reference rate.
Inverse Floater CMO	:	A CMO tranch structured as an inverse floater.
Investment Bank	:	A type of bank defined by the US law that underwrites and trades securities.
Investment Company	:	A company that pools money from multiple investors for investment by a professional manager.
Investment Company Act of 1940	:	The US legislation authorizing the SEC to regulate investment companies.
Investment Grade Bond	:	A bond whose credit rating is BBB or better.

Investment Services Directive	:	1993, European financial legislation.
Johnson Curves	:	A family of curves used to model probability density functions.
Joint Normal Distribution	:	A multivariate distribution, all of whose marginal distributions are normal, and such that any linear polynomial of the distribution is normal.
Jump-Diffusion Model	:	A stochastic process that combines random jumps with a geometric Brownian motion.
Junk Bond	:	A bond whose credit rating is below BBB.
Карра	:	Alternative name for the Greek factor sensitivity Vega.
Key Factor	:	A risk factor whose conditional probability distribution is directly modeled by a VaR measure.
Key Vector	:	The vector of key factors.
KMV Model	:	A commercial implementation of the asset value model of credit risk.
Knock-in Option	:	A type of path-dependent option.
Knock-out Option	:	A type of path-dependent option.
Least Squares Remapping	:	A global remapping implemented using the method of least squares.
Legal Risk	:	Risk from uncertainty due to legal actions or uncertainty in the applicability or interpretation of contracts, laws or regulations.
Leverage	:	Debt financing or anything that can similarly magnify the risk and reward of an investment.
Leveraged Inverse Floater	:	An inverse floater with coupon leverage greater than one.
Levine, Dennis	:	Investment banker who formed an insider trading ring during the 1980s.
Libor	:	London Interbank Offered Rate.
Limit	:	Risk limit.
Limit Utilization	:	Given a risk limit, the amount of risk being taken as a fraction of the limit.
Limit Violation	:	Risk taken in excess of that permitted by a risk limit.
Linear Derivative	:	A derivative instrument whose payoff diagram is liner or almost linear.
Linear Remapping	:	A global remapping that replaces a portfolio mapping function with a linear polynomial.
Linear Transformation	:	In the context of Value-at-Risk, a transformation procedure applicable to linear portfolios.

Linear VaR	:	A category of VaR measures applicable to linear portfolios.
Liquidity	:	Used in various senses, all relating to availability of, access to, or convertibility into cash.
Liquidity Risk	:	Risk due to uncertain liquidity.
Liquidity Spread	:	A yield or interest rate spread due to lack of liquidity.
Loan Guarantees	:	Commitment by a third party to meet a debtor's obligations in the event that the debtor is unable to do so.
Local Volatility Model	:	Any of a category of option pricing models that can be calibrated to volatility skew.
Log Return	:	One of several metrics of return.
Lognormal Distribution	:	A probability distribution.
Long	:	Holding an asset or otherwise having positive exposure to some financial quantity.
Long Position	:	A position that is long an asset or otherwise has positive exposure to some financial quantity.
Long-short Position	:	A position that is long one asset and short another.
London Interbank Offered Rate	:	Refers to indicative short-term interest rates available for most major currencies.
Look Back Option	:	A path dependent option whose payout depends upon the maximum or minimum underlier value achieved during the entire life of the option.
Loss Given Default	:	The fraction of credit exposure that will not be recovered in the event of default on a specified obligation.
LRAM	:	The Livermore Risk Analysis Methodology developed by Charles Cresson Wood using both control failure and Vulnerability Analysis to generate Risk Scenarios.
Macaulay Duration	:	Weighted average maturity.
Maintenance Margin	:	A minimum balance for a margin account that, if breached, results in a margin call.
Maloney Act of 1938	:	The US legislation authorizing oversight of securities firms by self-regulating organizations.
Managed CDO	:	A CDO whose collateral is actively managed by a portfolio manager.
Managed Futures	:	Portfolios of forwards or futures managed as an "alternative asset category."
Mapping Procedure	:	The procedure within a VaR measure that characterizes a portfolio's exposures.

Margin	:	Collateral.
Margin Account	:	An account holding funds available for making margin payments.
Margin Call	:	A demand for additional margin.
Margrabe Option	:	An out performance option.
mark-to-Market	:	The act of assigning a market value to an asset.
Mark-to-Market Exposure	:	Credit exposure calculated from instruments' current market values.
Market Exposure	:	For market-driven instruments, there is an amount at risk to default only when the contract is in-the-money (i.e., when the replacement cost of the contract exceeds the origination value). The exposure/uncertainty is captured by calculating the netted mean and standard deviation of exposure(s).
Mark-to-Market Mode	:	A mode of analysis for a portfolio credit risk model.
Mark-to-Model	:	Use of financial models to ascribe a market value to an asset.
Market Neutral	:	Having balanced long and short positions resulting in no net exposure to broad market moves.
Market Portfolio	:	A theoretical portfolio which comprises all risky assets available to investors.
Market Risk	:	Exposure to the uncertain market value of a portfolio.
Market Value	:	A valuation assigned to an asset based on the price it might fetch in the market.
Market Value CDO	:	A CDO whose payments to investors are contingent on the adequacy of the market value of its collateral.
Maximum likely Exposure	:	A metric for potential credit exposure.
Maximum Option	:	A form of rainbow option.
Mean	:	Expected value.
Mean Reversion	:	A tendency for a stochastic process to remain near, or return over time to a long-run average.
Mean Vector	:	The vector of the expected values of the components of a random vector.
Measure	:	An operation for assigning a number to something.
Measurement	:	A number obtained from applying a measure.
Merton (1973) Option Pricing Formula	:	A pricing formula for European options on stocks or stock indexes that have a known dividend yield.
Merton Model	:	Alternative name for the asset value model of credit risk.

Metric	:	An interpretation of the measurements obtained from a measure.
Micro Risk Assessment	:	The categorization and assessment of the functions, tasks, positions, processes, subsystems and sub-units of an Auditable Unit for the purposes of planning the audit of that unit (Audit Program).
Min-max Option	:	Either a minimum option or a maximum option.
Minimum Option	:	A form of rainbow option.
Mixed Distribution Model	:	Any of a category of option pricing models that can be calibrated to volatility skew.
ММ	:	Shorthand notation for millions.
Model Risk	:	The risk of loss due to weakness of the financial model(s) that a business uses for pricing inventory and managing risk.
Modern Portfolio Theory	:	A body of theory relating to how investors optimize portfolio selections.
Modified Duration	:	A modification of Macaulay duration.
Monte Carlo Method	:	The use of statistical sampling to solve quantitative problems.
Monte Carlo Transformation	:	For a VaR measure, a transformation procedure that employs the Monte Carlo method with pseudorandomly generated realizations.
Monte Carlo Simulation	:	A technique for approximating a probability distribution by generating uniformly distributed pseudo random numbers and transforming them into the required sort of random numbers. In option pricing one ordinarily works with lognormal random interest rates, prices, and indexes. If one constructs the probability distributions correctly, then a Derivative Product's value equals the expected discounted value of its payoff (in the limit as the number of random paths approaches infinity).
Monte Carlo VaR	:	A category of VaR measures that employ a Monte Carlo transformation.
Mortality Model	:	A type of default model.
Mortgage-Backed Security	:	A security interest in mortgage collateral.
Mortgage Pass-through	:	A securitized pool of mortgages.
Multiasset Option	:	A multifactor option.
Multilateral Netting	:	Netting of obligations between three or more parties.
Multinormal Distribution	:	Joint normal distribution.
Multivariate Normal Distribution	:	Joint normal distribution.

NASD	:	National Association of Securities Dealers.
National Association of Securities Dealers	:	A self-regulating organization of the US securities industry.
Net Return	:	Has two possible meanings. Most common is as a metric of return taking into account items such as management fees, custody fees and trading costs. Less common is as an alternative word for simple return.
Netting	:	The offsetting of cash flows or other obligations against each other.
Netting by Novation	:	The legal obligations of the parties to make required payments under one or more series of related transactions are canceled and a new obligation to make only the net payments is created.
Non-linear Derivative	:	A derivative instrument whose payoff diagram in highly non-linear.
Normal Distribution	:	A continuous probability distribution whose probability density function has a "bell" shape.
Notice Date	:	The date on which a party that is short a future gives notice of delivery.
Notice of Delivery	:	Notice to a futures exchange of intent to close a short futures position by delivery.
Notional Amount	:	The quantity of an underlier to which a derivative instrument applies.
Notional Limit	:	A risk limit based upon notional amount as a crude exposure metric.
Obligor	:	A counterparty that poses credit risk.
000	:	Office of the Comptroller of the Currency.
Offset	:	The closing of a futures position by taking an opposite position in the same contract.
Omega Risk	:	i. Currency risk associated with an option contract on an underlying instrument priced in a different currency.
		ii. Currency risk associated with translating the value of a currency option position in a different currency to a base currency.iii. Currency correlation risk.
Operational Risk	:	Risk to financial or other institutions from inadequate or failed internal processes, people and systems or from external events.
Option	:	A type of derivative instrument.
Option-adjusted Spread	:	Yield spread not attributable to imbedded options.
Option Holder	:	The party to whom an option grants rights, usually the purchaser.
Option Issuer	:	Option writer.

Option Pricing Theory	:	The body of financial theory used by financial engineers to value options and other derivative instruments.
Option Spread	:	A position combining two or more options on a single underlier.
Option Valuation	:	Any procedure for assigning a market value to an option.
Option Writer	:	The party who grants an option, usually the seller of an option.
Orange County Debacle	:	In 1994, the Orange County investment pool lost USD 1.7 billion from speculative activities.
Out-of-the-money	:	A condition, where, an option is neither at-the-money nor has any intrinsic value.
Out Performance Option	:	An option to exchange one asset for another.
Over-the-Counter	:	Traded in some context other than a formal exchange.
Overlay Strategy	:	Addition of managed futures to an existing investment portfolio.
Overnight	:	Commencing immediately and lasting for one trading day.
Own Funds Directive	:	1989, European legislation defining capital for banks.
PAC Bond	:	A type of CMO bond that has minimal prepayment risk.
PAC-II Bond	:	A support bond for a PAC bond that is itself structured as a PAC bond.
PAC-III Bond	:	A support bond for a PAC II bond that is itself structured as a PAC bond.
Paperwork Crisis	:	A crisis in the US brokerage industry during the late 1960s.
Parametric VaR	:	Linear VaR.
Payment Netting	:	Netting of cash flows.
Payoff	:	The net P&L from an options spread.
Payoff Diagram	:	A graph of an options spread's payoff as a function of underlier value at expiration.
Peek-a-Boo	:	Public Company Accounting Oversight Board.
Perfected Interest	:	A claim that is senior to any existing or future third-party claims in the event of bankruptcy.
Physical Delivery	:	A derivative instrument has physical delivery if it settles with actual delivery of some underlier.
Physical Settlement	:	Settlement of a derivative instrument with physical delivery of an underlier.
Planned Amortization Bond	:	A type of CMO bond that has minimal prepayment risk.
Portfolio Credit Risk	:	The sum credit risk of a portfolio of obligations.

Portfolio Credit Risk Model	:	A model of portfolio credit risk.
Portfolio Mapping	:	A functional relationship specified by a VaR measure between a portfolio's value and the key vector.
Portfolio mapping Function	:	The function that defines a portfolio mapping.
Portfolio Remapping	:	A remapping that simplifies a portfolio mapping by replacing the mapping function and/or key vector.
Portfolio Theory	:	A body of theory relating to how investors optimize portfolio selections.
Potential Exposure	:	Credit exposure that may develop on an obligation due to possible changes in its market value.
Premium	:	The purchase price of an option.
Prepayment	:	The payment of a debt prior to its being due.
Prepayment Protection Band	:	A range of prepayment rates between which a PAC bond will redeem principal according to schedule.
Prepayment Risk	:	Risk to holders of Mortgage-Backed Securities arising from uncertainty in the rates at which mortgagors will prepay.
Pre-settlement Risk	:	Credit risk of default on a derivative instrument prior to final settlement.
Primary Instrument	:	A financial instrument whose value is not derived from that of another instrument, but instead is determined directly by a market.
Primary Mapping	:	A portfolio mapping constructed directly from the portfolio's holdings.
Principle Component Remapping	:	A portfolio remapping implemented using principal component analysis.
Private-Label Mortgage-Backed Security	:	An MBS issued by an entity that is not a quasi-agency of the US Government.
Process Failure Risk Model	:	A specialized Risk Model that makes use of multiple Risk Scenarios and Exposure assessments as well as feedback loops to continuously update scenarios and exposures to changes in the process.
Process Risk	:	The risk in a business process (as opposed to Functional Risk). The new Risk Paradigm for auditors focuses more on business processes and process risk.
Public Company Accounting Oversight Board	:	A US federal agency tasked with overseeing external auditors.
Put	:	An option to sell an asset.

Put-call Parity	:	A relationship between the prices of European put and call options on the same underlier.
Put Spread	:	An options spread comprising a long-short position in put options.
Putting on a Spread	:	The act of purchasing and/or selling instruments to comprise an options or futures spread.
Quadratic Portfolio	:	In the context of Value-at-Risk, a portfolio whose portfolio mapping function is a quadratic polynomial.
Quadratic Remapping	:	A global remapping that replaces a portfolio mapping function with a quadratic polynomial.
Quadratic Transformation	:	For a VaR measure, a transformation procedure that is applicable to quadratic portfolios.
Quadratic VaR Measure	:	A category of VaR measures that are applicable to quadratic portfolios.
Quant	:	A financial engineer.
Quantile	:	A notion from probability.
Quanto	:	A cash settled derivative that has an underlier denominated in one currency, but settles in another currency based on a fixed exchange rate.
Quanto Swap	:	An interest rate swap linked to different currency's interest rates.
Quartile	:	A type of quantile.
Rainbow Option	:	A category of option linked to two or more underliers.
Range Forward	:	A type of derivatives hedge.
Ratchet Cap	:	A cap whose strike is reset to the current rate for each caplet.
Ratchet Floor	:	A floor whose strike is reset to the current rate for each floorlet.
Ratchet Option	:	An option that periodically "locks in" profits.
Rate of Return	:	Annualized return.
Ratings Migration Model	:	A default model based upon historical patterns of changes in bonds' credit ratings.
Ratings Transition Matrix	:	A matrix indicating probabilities of upgrades or downgrades in bonds' credit ratings.
Ratio Call Spread	:	A call spread in which there is not a one-to-one ratio between the numbers of long- and short-calls.
Ratio Put Spread	:	A put spread in which there is not a one-to-one ratio between the numbers of long- and short-puts.
Recovery Rate	:	In the event of a default, the fraction of the outstanding obligation expected to be recovered through bankruptcy proceedings or some other form of settlement.
Reduced Form Model	:	Intensity model.

Regime Switching Model	:	A category of stochastic processes.
Regular-way Settlement	:	Settlement on the third trading day after the trade date.
Regulatory Capital	:	Capital that is held in accordance with statutory or regulatory requirements. Set by the BIS, the amount of Tier-I and Tier-II long term funding that commercial banks are compelled to hold based upon the "Basel Accord" regulations for risk adjustment.
Regulatory Capital allocation	:	A process intended to ensure that an organization engages in transactions, that are — usually from a cost of regulatory capital standpoint — most desirable.
Rehypothecation	:	The reuse of collateral for one's own purposes.
Remapping	:	In Value-at-Risk, the approximation of one risk vector with another.
Replacement Cost	:	The cost of replacing an obligation of a counterparty.
Replacement Risk	:	The consequence of settlement risk. If you have not received payment from your counter party, you now have to enter the market and make the necessary purchase/sale to settle your books thus exposing your firm to the prevailing market rates.
REPO	:	Repurchase agreement.
REPO Rate	:	The rate of interest on a general collateral REPO transaction.
Repurchase Agreement	:	An agreement to sell and subsequently repurchase a security.
Residual Risk	:	The remaining Risk after Risk Management techniques have been applied.
Return	:	Return on investment or an analogous mathematical concept applied to any time series.
Return on Investment	:	Any of a number of metrics for the change in an asset's or portfolio's accumulated value.
Reverse REPO	:	The opposite side of a repo transaction.
Rho	:	The Greek factor sensitivity measuring a portfolio's first order (linear) sensitivity to the risk-free rate.
Risk	:	A measure of Uncertainty. In the business process, the uncertainty is about the achievement of organizational objectives. May involve positive or negative Consequences, although most positive risks are known as Opportunities and negative risks are called simply risks.
Risk Adverse	:	Preferring less risk to more.
Risk Adjusted Return on Capital (RAROC)	:	A measurement tool that enables management to allocate capital, and the related cost of capital, in respect of credit, market and operational risk by type of transaction, client and line of business. This facilitates the deployment of capital to business units that can provide the maximum shareholder value on the capital invested.

Risk Assessment	:	The identification of risk, the measurement of risk, and the process of prioritizing risks.
Risk Committee	:	A board level committee with responsibility for issues related to financial risk management.
Risk Capital	:	Bank Management's view of how much buffer should be prudently held to protect the institution from volatility of value in its assets and liabilities.
Risk Evaluation	:	Risk evaluation is used in risk management to rank risks against nominated criteria and to set risk priorities.
Risk Factor	:	A random variable whose value will affect the value of a portfolio.
Risk Limit	:	A limit placed upon risk taking activity for the purpose of avoiding excessive risk.
Risk Loving	:	Alternative word for "risk seeking."
Risk Management	:	Generally means financial risk management, but other meanings are possible.
Risk Management Department	:	A department within a firm that is responsible for financial risk management.
Risk Manager	:	A professional who performs duties related to risk management.
Risk Matrix	:	A form of Risk Measurement and Risk Prioritization in one step that uses risks on the horizontal axis and system components or audit steps on the left axis. Both axes are sorted to the left corner (High), creating a matrix with quadrants of High, Medium and Low groups of elements and risks.
Risk Measure	:	An operation for quantifying a risk.
Risk Measurement	:	A number obtained from applying a risk measure.
Risk Metric	:	An interpretation of the measurements obtained from a risk measure.
Risk Neutral	:	Indifferent to risk.
Risk Neutral Valuation	:	A concept that underlies many techniques for pricing options and other derivatives.
Risk Oversight Committee	:	A committee of senior managers with responsibilities related to financial risk management.
Risk Reduction	:	Risk reduction is used in risk management to describe the application of appropriate techniques to reduce the likelihood of an occurrence, its consequences, or both. Along with risk avoidance, risk acceptance and risk transfer, risk reduction is one of the options for risk treatment.
Risk Seeking	:	Preferring more risk to less.
Risk Vector	:	A random vector whose components are risk factors.
Risk Metrics	:	A free service launched by JP Morgan in 1994, to promote the use of Value-at-Risk.

Robust	:	Related to Risk Models, robustness is a measure of a model's strength in handling data and data errors without model failure.
Rocket Scientist	:	A financial engineer.
Scenario Analysis	:	A technique used in Asset-Liability Management.
SEC	:	Securities and Exchange Commission.
Second Banking Co-ordination Directive	:	1989 European financial legislation.
Secured Lending	:	Collateralized lending.
Securities Act of 1933	:	The US legislation to regulate the primary (underwriting) market for securities.
Securities and Exchange Commission	:	The primary regulator of US securities markets.
Securities Exchange Act of 1934	:	The US legislation to regulate the secondary market for securities.
Securities Investor Protection Corporation	:	A corporation established by the US Federal Government to insure investors accounts at brokerage firms.
Securities Lending	:	The lending of securities, usually for a fee.
Semi-Variance	:	An alternative to variance that focuses on negative values of a distribution.
Separation Theorem	:	The result that portfolio composition and portfolio leveraging are two unrelated decisions.
Sequential Pay CMO Bond	:	A type of CMO bond.
Servicing Fee	:	A fee subtracted from the cash flows of a mortgage pass-through to cover the cost of servicing the pooled mortgages.
Settlement	:	In finance, performance on a contractual obligation.
Settlement Date	:	The date on which a trade settles — delivery of what is being traded in exchange for payment.
Settlement Price	:	A price set for a futures contract at the close of trading for the purpose of calculating margin payments.
Settlement Risk	:	A form of credit risk that arises at the settlement of a transaction. Risk that relates to making an fixed payment to a counter party before the counter payment is received. This risk arises from the
		possibility that your counter party will never pay you.

Sharing Risk	:	A Risk Management technique for distributing the possible Consequences of risk among several parties. Insurance and other contracts are methods used to share or Transfer Risk.
Short	:	(n.) a short seller; (v.) to sell short; (adj.) having a net negative position in an asset or otherwise having negative exposure to some financial quantity.
Short Position	:	A position that is short an asset or otherwise has negative exposure to some financial quantity.
Short Sale	:	Sale of a borrowed security.
Short Seller	:	Someone who sells an asset short.
Short Squeeze	:	A speculative trading strategy that takes advantage of short sellers' need to eventually buy back assets they are short.
Simple Interest	:	A method of crediting interest in which interest is not earned on interest.
Simple Return	:	One of several metrics of return.
Solvency Ratio Directive	:	1989 European legislation specifying capital requirements for the non-trading portion of a bank's balance sheet.
Special Security	:	A security for which there is particular demand in the REPO market.
Specific Risk	:	That component of an instrument or portfolio's market risk that is uncorrelated with the overall market.
Speculative Grade Bond	:	Junk bond.
Spot Curve	:	A graph of spot interest rates for different maturities.
Spot Loan	:	A loan that commences spot.
Spot-Next	:	A loan commencing spot and lasting one trading day.
Spot Price	:	The price at which trades for spot settlement transact.
Spot Rate	:	The rate of interest on a spot loan that accumulates interest to maturity.
Spot Settlement	:	Settlement of a trade almost immediately — within a number of trading days that is standardized for each market.
Spot Trade	:	A trade for spot settlement.
Spread Option	:	An option on a spread.
Spread Risk	:	Market risk due to exposure to some spread.
Spread Trading	:	Trading of futures spreads.
Square Root of Time Rule	:	A formula for computing a volatility for one unit of time from a volatility for a different unit of time.
Smm	:	Single monthly mortality.

Standard Deviation	:	A parameter describing the dispersion of a probability distribution.
Standard Normal Distribution	:	The normal distribution with mean 0 and variance 1.
Static CDO	:	A CDO whose collateral is not actively managed by a portfolio manager.
Stationarity	:	Covariance stationarity.
Sticky Delta	:	A model, whereby, volatility skew is stable relative to option deltas.
Sticky Strike	:	A model, whereby, volatility skew is stable relative to option strikes.
Stochastic Calculus Approach	:	An informal name for derivatives pricing models that employ stochastic calculus with risk neutral valuation or other techniques based upon modeling future asset values.
Stochastic Process	:	A model for a time series.
Stochastic Volatility Model	:	An option pricing model that treats both the underlier value and its volatility as stochastic processes.
Stock Investment Risk	:	The risk of investing in stocks. These include both short-term and prolonged price declines.
Stop-Loss Limit	:	A market risk limit based upon mark-to-market loss as a metric of risk.
Straddle	:	An options spread comprising a long put and a long call both with the same strike price.
Strangle	:	An options spread comprising a long put and a long call, both with out-of-the-money strike prices.
Stratified Sampling	:	A technique of variance reduction for the Monte Carlo method.
Strict Stationarity	:	A property of some stochastic processes.
Strike Price	:	The price specified by an option at which an asset is to be purchased or sold.
Subcustodian	:	A custodian who holds securities locally on behalf of foreign investors.
Subordinate PAC Bond	:	A pack bond that is paired with a super PAC bond to take most of the prepayment risk.
Sumitomo Corp. Debacle	:	A 1996 rogue trader scandal.
Super-efficient Portfolio	:	A notion from portfolio theory.
Super PAC Bond	:	A form of PAC bond that is structured to have less prepayment risk than an accompanying subordinate PAC bond.
Support Bond	:	A bond that takes most of the prepayment risk in a PAC CMO structure.
Survival Function	:	Probability of avoiding default expressed as a function of time.

Synthetic CDO	: A CDO that creates credit exposures for investors primarily through CDSs. (Controlled Debt Structures).
Systematic Risk	: That component of an instrument or portfolio's market risk that is correlated with the overall market.
TAC Bond	: Targeted amortization class bond.
Targeted Amortization Class	: A type of CMO bond structured to minimize risk due to high prepayment rates.
Tax Spread	: A (usually negative) yield or interest rate spread due to some tax advantage.
TED Spread	: Treasury-Eurodollar spread.
Term REPO	: A long-term REPO transaction.
Theta	: The Greek factor sensitivity measuring a portfolio's first order (linear) sensitivity to the passage of time.
Time Series	: A series of observations made over a period of time.
Time Value	: A component of the market value of an option.
Time Value of Money	: Used informally to refer to the fact that the present value of future cash flows decreases with the amount of time until they are to be received.
Tom-Next	: A loan commencing in one trading day and lasting one trading day.
Total Return	: A return on investment calculated from accumulate values reflecting only price appreciation and income from dividends or interest.
Total Return Swap	: A type of credit derivative.
Trading Book	: Under bank regulations, a portion of a bank's balance sheet set side for trading activities.
Tranch	: One of the bonds issued by a CMO, CDO or other form of asset securitization.
Transfer Risk	: A Risk Management technique to remove risk from one area to another or one party to another. Insurance transfers risk of financial loss from insured to insurer. Partial transfers are known as Sharing Risk.
Transformation Procedure	: One of the three essential components of a VaR measure.
Transaction Exposure	: i. Also known as exchange risk. This reflects the potential gain or loss from transactions in fx. These transactions could be attributed to accounts receivable, payable or transactions that may occur in the future, such as being awarded a contract.
	ii. Applies to the fluctuation of reported earnings/cash flows of a corporation due to the exchange rate(s) used to convert the statements of foreign subsidiaries and affiliates.
Tunnel	: A type of derivatives hedge.

Two-Asset Correlation Option	:	A type of rainbow option.
Unconditional Heteroskedasticity	:	A condition, where, a stochastic process has non-constant unconditional second moments.
Underlier	:	A primary instrument or variable upon which the value of a derivative instrument depends.
Unexpected Loss	:	A risk metric related to the second moment of a portfolio's losses due to default over a specified horizon.
Uniform Distribution	:	A continuous probability distribution that has constant probability on a finite interval.
Uniform Net Capital Rule	:	The SEC's rule setting minimum capital requirements for broker- dealers trading non-exempt securities.
Universal Bank	:	A bank that engages in both commercial banking and investment banking activities.
Universal Volatility Model	:	Any of a class of option pricing models that model volatility skew by combining elements of local volatility, jump-diffusion and stochastic volatility models.
Utilization	:	Given a risk limit, the amount of risk being taken as a fraction of the limit.
Value-at-Risk	:	A category of market risk measures.
Value Date	:	The date on which a trade is intended to settle.
Vanilla Derivative	:	A derivative instrument that is simple or of a common form.
Vanilla Option	:	A simple put or call option.
Value-at-Risk (VaR)	:	The total value of a portfolio that could potentially be adversely affected by market movements. A probability factor is normally attached to such a potential event.
VaR Horizon	:	The period of time over which a VaR measure assesses a portfolio's market risk.
VaR Implementation	:	An implementation of a VaR measure, generally as software on a computer.
VaR Limit	:	A market risk limit that uses some VaR metric to quantify and limit risk.
VaR Measure	:	A set of operations by which a portfolio's VaR is calculated.
VaR Measurement	:	The numerical value a VaR measure assigns to a portfolio's market risk.
VaR Metric	:	An interpretation of a VaR measure.
VaR Model	:	The financial theory, mathematics, and logic that motivate a VaR measure.
Variables Remapping	:	A type of remapping used in Value-at-Risk measures.

Variance	:	A parameter describing the dispersion of a probability distribution.
Variance- Covariance VaR	:	Linear VaR.
Variation Margin	:	A margin payment to restore a margin account to the initial margin level.
vcv VaR	:	Shorthand for "variance-covariance VaR".
Vega	:	The Greek factor sensitivity measuring a portfolio's first order (linear) sensitivity to the implied volatility of an underlier.
Volatility	:	A metric of variability in a stochastic process.
Volatility Skew	:	A condition where implied volatilities vary by strike.
Volatility Smile	:	A condition where implied volatilities for in-the-money and out-of- the-money strikes exceed those for at-the-money strikes.
Volatility Surface	:	A function describing implied volatilities' dependence on both strike and expiration.
Volatility Term Structure	:	A curve that describes volatility as a function of expiration for a given strike.
Worst-of Option	:	A form of rainbow option.
Wrangle	:	An options spread that is long (short) both a ratio call spread and a ratio put spread.
Writer Extendible Option	:	An option whose expiration is extended if some pre-defined condition is met.
Yield Curve	:	A graph of yields as a function of maturity.
Z Bond	:	A type of CMO bond, also called an accrual bond.
Zero Coupon Curve	:	Spot curve.
Zero Coupon Rate	:	Spot rate.