CREDIT RISK MANAGEMENT IN INDIA: RISK BASED MODELS

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Abstract

"All of life is the management of risk, not its elimination."

Walter Wriston, former chairman of Citicorp

Corporations are in the business of managing risks. The most adept ones succeed; others fail. Whereas some firms passively accept financial risks, others attempt to create a competitive advantage by judicious exposure to financial risks. In both cases, however, these risks should be monitored carefully because of their potential for damage. The primary function of financial institutions is to manage financial risks actively. The purpose of financial institutions is to assume, intermediate, or advise on financial risks. These institutions realize that they must measure sources of risk as precisely as possible in order to control and properly price risks. Understanding risk means that financial managers can consciously plan for the consequences of adverse outcomes and, by doing so be better prepared for the inevitable uncertainty. Risk comes from many resources. Risk can be human-created, such as business cycles, inflation, changes in government policies, and wars. Risks also occur from unforeseen natural phenomena, including weather and earthquakes. Risk also arises from technological innovations, which can render existing technology obsolete and create dislocations in employment. Thus risk and the willingness to take risk are essential to the growth of an economy. In this paper I have covered prevailing risks and their management.

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What is exactly risk?

Risk can be defined as the volatility of unexpected outcomes, generally the value of assets or liabilities of interest. In statistical terms, risk is defined as the degree of variability of possible outcomes for a particular event. In financial terms, risk is always associated with loss that is expected to be incurred due to the happening or non-happening of certain events or activities

"The fact is that bankers are in the business of managing risk, pure and simple, that is the business of banking."

Assumption and management of risk is the very essence of banking business. Risk here refers to the sensitivity of a bank's profitability to spatial and temporal dispersion of market parameters (e.g. interest rates, exchange rates, loan default, etc.) around their expected values. Globalization, liberalization and deregulation of financial markets have resulted in enhanced volatility in interest and exchange rates, rapid growth of innovations and a reduction in barriers relating to business diversification. All of this has been aided by rapid technological development. Consequently, the risks in financial markets and availability of instruments to analyze / manage them have multiplied. A typical bank accepts large number of short-term deposits and tries to lend medium to long-term. The leftover money is used for investment purposes. Thus, a bank has deposits and equity on liability side and loans and investments on assets side of its balance sheet. The value of each of these components is subject to uncertainties. For financial institutions and corporations, asset and liability management includes those activities that attempt to control exposure to financial and other price risks. The main purpose of asset and liability management is to make the consideration of risk explicit in the planning process and to enable decision makers to control risk exposure.

- **Liquidity Risk**

Liquidity risk is the potential inability of a bank to generate sufficient cash to meet its normal operating requirements (cash expenses and repayment of liabilities). A mismatch in the assets and liabilities causes a bank to have a liquidity risk. A bank often promises greater liquidity in its liabilities than its assets can provide directly. To deal with such contingencies, a bank must have sources of liquidity - ways it can lay its hands on cash whenever it needs it. banks seek to achieve a reasonable trade-off between overtly liquid and relatively illiquid.

- **Interest Rate Risk**

Interest rate risk is the risk of an adverse effect of interest rate movements on a bank's profits or balance sheet. Interest rates affect a bank in two ways - by affecting the profits and by affecting the value of its assets or liabilities. If the money borrowed is on floating rate basis the bank faces the risk of lower profits in an increasing interest rate scenario. Similarly fixed rate assets face the risk of lower value of investments in an increasing interest rate scenario. Interest rate risk becomes prominent when the assets and liabilities of the bank do not match in their exposure to interest rate movements.

Foreign Exchange Risk

Foreign Exchange Risk is the chance that a fluctuation in the exchange rate will change the profitability of a transaction from its expected value. It is the risk that arises due to unanticipated changes in exchange rates, which arises due to the presence of multi-currency assets and liabilities in a bank's balance sheet. Fluctuations occur over the medium and long-term and also during a dealing session on a moment to moment basis.

Operations Risk

Operations risk is the risk that deficiencies in information systems or internal controls will result in unexpected loss. This risk is associated with human error, system failures and inadequate procedures and controls. Operations Risk exist for any organization arising out of day to day business activities. The operations risk that a bank faces include the risk of fraud, theft, etc.

Credit Risk

Credit risk or default risk involves inability or unwillingness of a customer or counterparty to meet commitments in relation to lending, trading, hedging, settlement and other financial transactions. The credit risk of a bank's portfolio depends on both external and internal factors. The external factors are the state of the economy, wide swings in commodity/equity prices, foreign exchange rates and interest rates, trade restrictions, economic sanctions, Government policies, etc. The internal factors are deficiencies in loan policies/administration, absence of prudential credit concentration limits, inadequately defined lending limits for Loan Officers/Credit Committees, deficiencies in appraisal of borrowers' financial position, excessive dependence on collaterals and inadequate risk pricing, absence of loan review mechanism and post sanction surveillance, etc.

As per the RBI Guidance Note, October 2002

"Credit risk is defined as ***the possibility of losses associated with diminution in the credit quality of borrowers or counterparties. In a bank's portfolio, losses stem from outright default due to inability or unwillingness of a customer or counterparty to meet commitments in relation to lending, trading, settlement and other financial transactions. Alternatively, losses result from reduction in portfolio value arising from actual or perceived deterioration in credit quality***. "

Credit risk emanates from a bank's dealings with an individual, corporate, bank, financial institution or a sovereign. Credit risk may take the following forms:

- **In the case of direct lending: principal/and or interest amount may not be repaid;**
- **In the case of guarantees or letters of credit: funds may not be forthcoming from the constituents upon crystallization of the liability;**
- **In the case of treasury operations: the payment or series of payments due from the counter parties under the respective contracts may not be forthcoming or ceases.**
- **In the case of securities trading businesses: funds/ securities settlement may not be effected;**
- **In the case of cross-border exposure: the availability and free transfer of foreign currency funds may either cease or restrictions may be imposed by the sovereign.**

Credit Risk Management

Risk is inherent in all aspects of a commercial operation and covers areas such as customer services, reputation, technology, security, human resources, market price, funding, legal, regulatory, fraud and strategy. However, for banks and financial institutions, credit risk is the most important factor to be managed. The aim of risk management is to maintain overall and specific risks at the desired levels, at the minimum possible cost. Risk management is the process by which various risk exposures are identified, measured, and controlled. For a bank the risk management process primarily involves Asset-Liability Management. Although bank would have managed a major portion of its risks by having in place a proper ALM framework, Credit Risk is also an essential part of the integrated risk management process as the profitability and liquidity of a bank depends largely on the forecasted cash flows. If there is any delay in cash inflows by ways of non-payment of installments or loan repayment etc, all estimates regarding the interest

rate risk levels and the liquidity may go haywire. Thus the interest rate risk management and the liquidity risk management policies of a firm should be supplemented by a well laid down credit policy to manage the credit riskproactively, and optimise their credit risk at an individual level or at an entity level or at the level of a country. Given the fast changing, dynamic world scenario experiencing the pressures of globalisation, liberalization, consolidation and disintermediation, it is important that banks have robust credit risk management policies and procedures, which are sensitive and responsive to these changes. -The goal of credit risk management is to maximise a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. 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.

-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 organisation.

-The quality of the credit risk management function will be the key driver of the changes to the level of shareholder return.

BUILDING BLOCKS OF CREDIT RISK MANAGEMENT

As per the RBI Guidance Note, October 2002: In a bank, an effective credit risk management framework would comprise of the following distinct building blocks:

a) Policy and Strategy

b) Organizational Structure

c) Operations/ Systems

Policy and Strategy

The Board of Directors of each bank shall be responsible for approving and periodically reviewing the credit risk strategy and significant credit risk policies.

- Every bank should have a credit risk policy document approved by the Board.
- Credit risk policies should also define target markets, risk acceptance criteria, credit approval authority, credit origination/ maintenance procedures and guidelines for portfolio management.

- The credit risk policies approved by the Board should be communicated to branches/controlling offices. All dealing officials should clearly understand the bank's approach for credit sanction and should be held accountable for complying with established policies and procedures.
- Senior management of a bank shall be responsible for implementing the credit risk policy approved by the Board.

Credit Risk Strategy

- Each bank should develop, with the approval of its Board, its own credit risk strategy or plan
- The strategy would include a statement of the bank's willingness to grant loans based on the type of economic activity, geographical location, currency, market, maturity and anticipated profitability.
- The credit risk strategy should provide continuity in approach as also take into account the cyclical aspects of the economy and the resulting shifts in the composition/ quality of the overall credit portfolio.
- Senior management of a bank shall be responsible for implementing the credit risk strategy approved by the Board.

Organizational Structure

Sound organizational structure is essential for successful implementation of an effective credit risk management system. The organizational structure for credit risk management should have the following basic features:

- the **Board of Directors** should have the overall responsibility for management of risks. The Board should decide the risk management policy of the bank and set limits for liquidity, interest rate, foreign exchange and equity price risks.
- The **Risk Management Committee** will be a Board level Sub committee including CEO and heads of Credit,.It will devise the policy and strategy for integrated risk management containing various risk exposures of the bank including the credit risk.
- Each bank may, depending on the size of the organization or loan/ investment book, constitute a high level **Credit Risk Management Committee (CRMC**). The Committee should be headed by the Chairman/CEO/ED, and should comprise of heads of Credit Department, Treasury, Credit Risk Management Department (CRMD) and the Chief Economist.

 Concurrently, each bank should also set up **Credit Risk Management Department** (CRMD), independent of the Credit Administration Department. The CRMD should measure, control and manage credit risk on a bank-wide basis within the limits set by the Board/ CRMC, Enforce compliance with the risk parameters and prudential limits set by the Board/ CRMC, lay down risk assessment systems, develop MIS, monitor quality of loan/ investment portfolio, identify problems, correct deficiencies and undertake loan review/audit. Large banks could consider separate set up for loan review/audit etc.

Operations / Systems

Banks should have in place an appropriate credit administration, credit risk measurement and monitoring processes. The credit administration process typically involves the following phases:

 Relationship management phase i.e. business development.

 Transaction management phase covers risk assessment, loan pricing, structuring the facilities, internal approvals, documentation, loan administration, on going monitoring and risk measurement.

 Portfolio management phase entails monitoring of the portfolio at a macro level and

Process of credit risk management

The process of credit risk management begins with a scientific identification of the risk involved in the loan transactions along with the nature and frequency of such risk factors, understanding and analyzing the causes of the risk, formulating Credit Risk Management In India: Risk Based Models strategies and taking actions to avoid the risk and continuously monitoring the situation to ensure that the risk avoidance succeeds to a larger extent. Broadly, the process of credit risk management comprises the following functions:

Risk identification: involves the understanding of the nature of various kinds of risk, the circumstances, which lead a situation to become a risk situation, and causes due to which the risk can arise. It is important that the risk should be categorized in various categories, so that while formulating the risk management strategies, the focus should be on exact risk factor.

Risk quantification: is an assessment of the degree of the risk, which a particular transaction or an activity is exposed to. Though the exact measurement of risk is not possible but the level of the

risk can be determined with the help of the risk rating models. When an organization, is considered for extending financial support, the bank or institutions are required to examine a number of aspects concerning the activity/business being conducted or proposed to be undertaken. Such verification may also include visits to the work-sites and discussions with the people at operational level and collection of opinion reports about the promoters/owners, the industry, and the unit etc. based on such information and its analysis, the officials can come out with preliminary findings about the performance and prospects.

Risk control: is the stage in risk management where the financing institutions take steps to control the risk with the help of various tools Credit Risk Management In India: Risk Based Models formulation. Policy is a long-term framework to tackle risk, given the standard level of exposures that the bank will have to maintain in order to protect cash flows. Setting policies for risk management will depend on the bank's objective and its risk tolerance level.

Risk monitoring: in monitoring, the bankers have to fix up the parameters on which performance of a supported business is to be tested to be sure that there is no risk to viable existence of the finance unit or investment of the bank. The bankers have to be in continuous touch with the assisted organization to understand their problems for timely support and advice. Information requirements in such cases will be important as it is flow of regular information from borrowing entity to the bank that will enable the bankers to know about the viability or otherwise of the operations.

Risk pricing: fixation of price based on the degree of risk is a fundamental tenet of risk management. The borrowers with weak financial position and placed in high credit risk category are required to be priced higher than the one carrying lower risk. The pricing of loans normally should be linked to risk rating or credit quality.

Instruments Of Credit Risk Management Credit Risk Management encompasses a host of management techniques, which help the banks in mitigating the adverse impacts of credit risk. **PRUDENTIAL LIMITS**

In order to limit the magnitude of credit risk, prudential limits should be laid down on various aspects of credit:

a) Stipulate benchmark current/debt equity and profitability ratios, debt service coverage ratio or other ratios, with flexibility for deviations.

b) Single/group borrower limits, which may be lower than the limits prescribed by Reserve Bank to provide a filtering mechanism;

c) Substantial exposure limit i.e. sum total of exposures assumed in respect of those single borrowers enjoying credit facilities in excess of a threshold limit, say 10% or 15% of capital funds.

d) Maximum exposure limits to industry, sector, etc. should be set up. There must also be systems in place to evaluate the exposures at reasonable intervals and the limits should be adjusted especially when a particular sector or industry faces slowdown or other sector/industry specific problems. The exposure limits to sensitive sectors, such as, advances against equity shares, real estate, etc., which are subject to a high degree of asset price volatility and to specific industries, which are subject to frequent business cycles, may necessarily be restricted. banks may consider maturity profile of the loan book, keeping in view the market risks inherent in the balance sheet, risk evaluation capability, liquidity, etc.

Risk Rating

Credit rating is one of the important tools of credit risk management as it helps the banking and lending institutions to understand various dimensions of risk involved in different credit transactions. Risk rating or credit risk analysis is essentially a default risk analysis or making decision about credit worthiness of the borrowers or estimating the probability of repayment. The aggregation of such credit rating across the borrowers, activities and lines of business can give broader assessment of the quality of the credit portfolio of a branch, region, zone or a bank.

As per the RBI Guidance Note, October 2002

"A Credit-risk Rating Framework (CRF) is necessary to avoid the limitations associated with a simplistic and broad classification of loans/exposures into a "good" or a "bad" category. Broadly, CRF can be used for the following purposes:

a. Individual credit selection, wherein either a borrower or a particular Exposure/ facility is rated on the CRF.

b. Pricing (credit spread) and specific features of the loan facility. This would largely constitute transaction-level analysis.

c. Portfolio-level analysis.

d. Surveillance, monitoring and internal MIS

e. Assessing the aggregate risk profile of bank/ lender.

Single point indicator of diverse risk factors of counter party and for taking credit decisions in a consistent manner. To facilitate this, a substantial degree of standardization is required in ratings across borrowers. The risk rating system should be designed to reveal the overall risk of lending, critical input for setting pricing and non-price terms of loans as also present meaningful information for review and management of loan portfolio. The risk rating, in short, should reflect the underlying credit risk of the loan book. The rating exercise should also facilitate the credit granting authorities some comfort in its knowledge of loan quality at any moment of time.

AS per the RBI Guidance Note, October 2002 the architecture of a credit risk frame work should comprise of the following:

1. Grading system for calibration of credit risk
    - Nature of grading system
    - Number of grades used
    - Key outputs of CRF
2. Operating design of CRF
    - Which exposures are rated?
    - The risk rating process
    - Assigning and monitoring risk ratings
    - The mechanism of arriving at risk ratings
    - Standardization and benchmark for risk ratings
    - Written communications and formality of procedures
3. CRFs and Portfolio Credit Risk
    - Portfolio surveillance and reporting
    - Adequate levels of provisioning for credit events
    - Guidelines for asset build up, aggregate profitability and pricing
    - Interaction with external credit assessment institutions

COMPONENTS OF A RISK RATING MODEL

Taking a few of the above stated factors into consideration the key factors that need to considered in a risk rating model are:

Rating Scale

The rating scale indicates the level of risk; a particular borrowing transaction carries with it. It being from minimum risk category and ends with loss asset category. A rating model helps to make distinction between various stages of a loan transaction and to draw appropriate conclusion. While there cannot be any prescription on the number of such spans but it should take into account different stages or levels of risk association with a borrowing entity.

Rating Parameters

The rating parameters are those aspects of the loan transaction, which are required to be put to test and then aggregated to draw final rating. The rating parameters generally take into consideration the following aspects:

1. Business Analysis

Industry Risk – Nature and basis of competition, key success factors, demand supply position, structure of industry, cyclical/ seasonal factors, government policies, etc.

Market position of the company within the industry – market share, competitive advantage, selling and distribution arrangements, product and customers' diversity, etc.

Operating efficiency of the company – Locational advantages, labour relationships, cost structure, technological advantages and manufacturing efficiency as compared to competitors, etc.

Legal position – Terms of prospectus, directors and their responsibilities' systems for timely payment and for protection against forgery/ fraud, etc.

2. Financial Analysis

Accounting quality – overstatement/ understatement of profit, audit qualifications, method of income recognition' inventory valuation and depreciation policies, of – balance liabilities, etc.

Earnings protection – Sources of future earnings growth, profitability ratio, and earnings in relation to fixed income charges, etc.

Adequacy of cash flow – In relation to debt and fixed and working capital needs, sustainability of cash flow, capital spending flexibility, working capital management, etc.

Financial flexibility – alternative financing plans in times of stress, ability to raise funds, asset redeployment potential, etc.

3. Management Evaluation

Track record of management – planning and control systems, depth of managerial talent and success plans, and capacity to overcome adverse situations, goals, philosophy and strategies.

4. Fundamental analysis

Assessment of true net worth of the company, its adequacy in relation to the volume of business and the risk profile of assets.

Asset quality– Quality of the company's credit risk management, system for monitoring credit, sector risk, exposure to individual creditors, management of problem credits, etc.

Liquidity management – Capital structure, term matching of assets and liabilities, policy on liquid assets in relation to financial commitments and maturing deposits.

Profitability and financial position – Historic profits, spreads on funds development, revenues on non-fund based services, accretion to reserves, etc.

Interest and tax sensitivity – Exposure to interest rate changes, tax law changes and hedge against interest rate risk, etc.

Weightage Of Risk Parameters

Another important aspect relating to parameters is the weightage an individual parameter gets in the overall rating. Some model may give high weight age to operational aspects another may give high weightage to financial or industry or to promoters. The weightage given to each parameter will have an effect on the effectiveness on the rating model. For instance if the major portion of the weightage goes to operational parameters alone, a borrower with good financial prospects, working in an industry with better prospects and with good management, may be found to be a more risky proposition. On the other hand, allocation of higher weightage to financial positions may ignore the conducting of business affairs, the strength of the management, positive track record of the Industry etc.

Advanced Credit Risk Rating Models

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

Z Score Model

Altman's Z score model is an application of multivariate discriminant analysis in credit risk modeling. Discriminant analysis is a multivariate statistical technique that analyses a set of variables in order to differentiate two or more groups by minimizing the within group variance and maximizing the between group variance simultaneously. Altman started with twenty

variables(Financial Ratios) and finally five of them were found to be significant. The resulting discriminant function was

$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$

Where,

X_1 = Working Capital / Total Assets

X_2 = Retained Earnings/Total Assets

X3=Earnings Before Interest And Taxes/Total Assets

X4=Market Value Of Equity/Book Value Of Total Liabilities

X5=Sales/Total Assets

Altman found a lower bound value of 1.81 (Failing Zone) and an upper bound value of 2.675 (Non Falling Zone) to be optimal. Any score in between 1.81 and 2.675 was treated as being in the zone of ignorance.

KMV Model

KMV Corporation has built a credit risk model that uses information on stock prices and the capital structure of the firm to estimate its default probability. The starting point of this model is the proposition that a firm will default only if its asset value falls below a certain level (Default Point), which is a function of its liability. It estimates the asset value of the firm and its asset volatility from the market value of equity and the debt structure in the option theoretic framework. Using these two values, a metric (Distance from default or DD) is constructed that represents the number of standard deviations that the firm's assets value is away from the default point.

Credit Metrics Approach

This provides a method for estimating the distribution of value of assets in a portfolio subject to changes in the credit quality of individual borrower. A portfolio consists of different stand along assets, defined by a stream of future cash flows each asset has over the possible range of future rating class. Starting from its initial rating, an asset may end in any one of the possible rating categories. Each rating category has a different credit spread, which will be used to discount the future cash flows. Finally, the simulation technique is used to estimate the value distribution of the assets.

Credit Risk+

Introduced by Credit Suisse Financial Products, Credit Risk+ is a model of default risk. Each asset has only two possible end of period states: Default and Non-default. In the event of default, the lender recovers a fixed proportion of the total exposure. The default rate is considered as a continuous random variable. It does not try to estimate the default correlation directly. The default correlation is assumed to be determined by a set of risk factors. Conditional on these risk factors, default of each obligor follows a Bernoulli distribution. To get the unconditional probability generating function for the number of defaults, it assumes that the risk factors are independently gamma-distributed random variables. The final step is to obtain the probability generating function for losses.

RISK PRICING

The lender must assign an interest rate to each prospective loan facility, based on its credit scoring and other characteristics. Risk-return pricing is a fundamental tenet of risk management. In a risk-return setting, borrowers with weak financial position and hence placed in high credit risk category should be priced high.

Comparison Pricing – Comparison Pricing is market pricing of credit with identical risk rating and with similar terms. The prime lending rates announced by most of the banks in India is typical of comparison pricing.

Intrinsic Value Pricing – under the intrinsic value pricing, the lender calculates the risk cost and other cost of the prospective loan such as cost of funds, loan servicing and non-current expenses and then sets an interest that, in effect, achieves an appropriate mark up over cost.

Default Risk Premium – If the expected probability of default is 'd' the expected probability of receiving payment is (1-d). A profitable loan contract rate 'R' must compensate the lender for the time value of money, as reflected by risk free rate of interest 'r' and the risk of default.

Portfolio Risk Premium - Lenders can not assess the riskiness of individual loan in isolation rather, this riskiness must be evaluated with respect of other loans in the portfolio

Maturity Risk Premium – The longer is the maturity of the loan, the greater is the interest rate risk and that borrowers' creditworthiness might deteriorate.

. **Collateral Risk Premium** – Substantial changes in the financial environment generally bring about significant volatility in the value of physical assets mainly real estate, aircrafts, restaurant material, equity and debt instruments, etc.

The Basel Committee On Credit Risk Management

The Basel Committee, established by the central-bank Governors of the Group of Ten countries at the end of 1974, meets regularly four times a year. It has about thirty technical working groups and task forces, which also meet regularly. It formulates broad supervisory standards and guidelines and recommends statements of best practice in the expectation that individual authorities will take steps to implement them through detailed arrangements - statutory or otherwise - which are best suited to their own national systems. In this way, the Committee encourages convergence towards common approaches and common standards without attempting detailed harmonization of member countries' supervisory techniques.

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