# PART Two

***Credit Risk Management***

## CHAPTER 6

**Credit Problems and Credit Risk**

## GENESIS OF CREDIT PROBLEMS

Banks follow standardized procedures for credit management. Yet a good number of credit exposures become nonperforming every year. Important factors that cause credit problems are discussed here.

### Lack of Due Diligence in Loan Processing

Under the traditional method of lending, banks carry out due diligence of credit proposals received from new customers to find out whether there are reasonable chances for success of the customer's project/business. Banks collect data and detailed particulars about new customers from published documents and markets, and process and analyze those data to generate three sets of information to screen the customers and select the ones that fall within the loan sanction standards. The first set of information relates to the societal background, the track record, and the market standing of the customer. The analysis enables the bank to form a view about the honesty, integrity, and trustworthiness of the customer. The second set of information relates to the technical feasibility of the project, the infrastructure support, the availability of inputs and personnel, the product quality and marketability, and the past experience and managerial capability of the customer. The analysis reveals whether the customer has reasonable infrastructure support and competency to carry on business in a competitive environment without interruption. The third set of information relates to the financial standing of the customer. Finance-and accounts-related data supplied by the customer are processed to compute standard financial ratios such as a debt-equity ratio, current assets–current liabilities ratio, turnover ratio, profitability ratio, and so on. The analysis of financial ratios and the balance sheet reveals whether the project/business is financially viable. Banks compile cash flow and funds flow statements based on standard assumptions about costs and benefits of the proposed project/business to examine the customer's ability to repay the loan and carry out sensitivity analysis to assess the extent of cushion

available in honoring the repayment obligation, if input costs and output prices change adversely. In this way, banks carry out a detailed due diligence exercise to take an informed and fact-supported decision on sanction of credit.

The genuine due diligence process for credit sanction, if meticulously followed, is likely to reduce the incidences of credit defaults. But in competitive financial markets there are a few factors that interfere with the due diligence process. The first factor is the working environment in which the loan managers operate. It is often seen that the criteria for assessment of the loan manager's performance are not qualitative; the performance efficiency evaluation parameters are usually quantitative. Besides, the corporate policy on rewards and punishments is most often not transparent. Banks fix high targets for lending and grant incentives through rewards and promotions if targets are achieved. The target-oriented approach for achieving accelerated growth of credit dilutes the appraisal process. Besides, intensive market competition that offers customers leverage to dictate terms influences the appraisal standard. The fast-track method of appraisal for securing a share in a loan, where it is syndicated, compels the loan managers to make decisions in haste without thorough assessment of loan proposals.

The second factor that affects the due diligence process is the lack of reliable information on the status and the outlook of the economies in which the bank operates. Many countries do not reveal long-term fiscal, trade, and import-export policies. Besides, the accounting and auditing standards vary between countries, which makes it difficult for the lenders to make a realistic assessment of the balance sheet and financial statements pertaining to the customers. The banks are often compelled to skip the due diligence exercise due to unavailability of certain vital information and make decisions on loans based on their intuitive risk perceptions.

The third factor is the mechanical approach, which banks follow to make decisions on loans relying mainly on credit scoring or credit risk grade. Often, banks attach more importance to risk grade and do not undertake a detailed appraisal of credit proposals. Computation of risk grade may be erroneous if the rating framework is defective. Decisions based solely on risk ratings may lead to larger numbers of defaults. The incidences of defaults will be lower if banks undertake due diligence for credit decisions, besides assignment of risk grade.

The fourth factor that dilutes the due diligence process is the eagerness of banks to increase the nonfund-based commitments in order to enlarge fee-based income, particularly when their profit margins shrink in falling interest rate

scenarios. The focus on nonfund-based facilities may lead to a sudden jump in the issue of financial guarantees, letters of credit, and underwriting commitments. The danger lies not in the increase of nonfund-based business, but in the deficiency of the process for appraisal of proposals. The appraisal and the investigation for grant of nonfund-based facilities to customers are not usually rigorous. The appraisal standard is diluted because it is believed that the liabilities of the bank are of a contingent nature, and if those arise at all, they will occur in the future and also in some of the cases. The strategy for increase in nonfund business is common among banks under a declining interest income scenario, as they earn income without parting with the funds. But the instances of devolvement of liabilities on banks from financial guarantees and letters of credit, due to the customers’ failure to honor contracts or fulfill commitments, are rather common. The weakness in the system lies in underestimation of risk associated with nonfund-based commitments and adoption of a softer attitude in performing the due diligence exercise. Banks usually do not assess the impact of devolvement from nonfund-based commitments on the customer's cash flows and fund flows and verify whether the revised cash flows will enable the customer to settle the dues arising from the devolvement of contingent liabilities.

### Inaccuracy in Entry-Point Rating

Banks take into account customer rating or facility rating for making decisions on loans and advances. They lay down a set of ground rules for establishing a new credit relationship as well as for continuation of credit to existing customers. A basic requirement of an effective credit risk management system is the prescription of a minimum entry-point risk grade for acceptance of new credit proposals. The risk grade of the borrower is generated either internally through an internal risk rating model or obtained from external rating agencies. The population of customers rated by external rating agencies is low, and where available, the ratings are confined to multinational companies and large corporations. Even otherwise, the ratings by reputed external rating agencies may not be apt, as was evident from the incorrect ratings assigned to mortgage- related securities that were downgraded within a year's time and that created a crisis in the financial market in the United States and contributed to the financial meltdown during 2007 1

Banks rely on their internal credit risk rating or credit scoring models for loan sanctions and loan pricing. But if the rating framework is not comprehensive or

periodically tested for validity, the rating will be erroneous. The internal rating is also likely to be inaccurate if some vital inputs are not available. In such circumstances, the risk rating may not reveal the potential weaknesses in the loan proposals. Unless the credit risk rating framework is comprehensive and flexible, and is cognizant of changing risk factors that impact or alter the risk profile of the customer, the risk rating will be erroneous. If the internal risk rating framework does not have mechanisms for automatic factoring of adverse developments that take place in the economy, the financial market, and the capital market, the assigned risk grade will be inaccurate. The assessment of the customer based on that rating will be biased, and the actual risk level associated with that loan will be higher than what is revealed by the risk grade. There is always some time lag before the risk ratings of new and old customers are modified in accordance with the changing risk factors. Credit problems arise because of inaccuracy in assigning entry-point ratings and also because of the time lag involved in modifying the ratings under changing scenarios.

### Undue Comfort from Lending against Collateral

Lending against collateral is considered a safe practice, as it is presumed that credit exposures with the backup of collateral are totally recoverable in the event of default by the borrower. But banks have suffered large losses for relying solely on collateral for lending, either due to decline in collateral values or absence of a market for sale of collateral, or because of the long-drawn-out court procedure involved in realizing collateral values. Collateral assets are of two types—financial collateral and nonfinancial collateral. Financial collateral, such as equities and debt instruments, are highly sensitive to changes in market variables. Their prices can change sharply with even small variations in interest rates or foreign exchange rates. Banks sometimes ignore the volatility in the prices of these assets and draw comfort from the marketability of the financial collateral taken as security against a loan. But a rise in the market interest rate can cause substantial erosion in the values of financial instruments held as collateral. The value realized from the sale of collateral may not cover the amount in default. Even the prescription of higher margins on financial collateral to protect loans against the fall in collateral values may fall short of the requirement in times of high market volatility.

Lending against nonfinancial collateral is also a common practice among banks. They grant loans and advances against the mortgage of land, buildings,

plants, and machinery. They also advance money for acquisition of personal assets by customers on which they retain hypothecation rights. In the event of default by the customers, banks often find it difficult to sell the nonfinancial collateral as the sale of second-hand assets is difficult due to the absence of suitable markets. Besides, there can be a significant decline in collateral value due to the passage of time. Most often, it will be a distress sale, and the realized value will be insufficient to cover the loan balance.

### Lack of Transparency in Related Party Lending

Related party lending refers to the credit facilities extended to the entities that are owned by the directors, the senior management, or the employees of a bank, or which are controlled by persons related to them. It also includes credit facilities to the concerns in which the directors or the senior management or the employees of the bank have a direct or indirect interest. Sometimes, the persons who manage the concerns, which owe money to the bank, operate under the command of the former sets of people. In such situations, the controlling interest is not clearly visible. The related party concept will thus cover not only the parties who have blood relations with the borrowers, but also those who have vested interests in the concerns that are indebted to the bank. There is no objection in principle to grant credit to related parties if the banking laws and bank regulators permit, but this form of lending is usually not merit based because most often the due diligence exercise is not carried out for making decisions on loans. The related party credit portfolio remains cloudy due to the lack of transparency of the relevant transactions and the absence of laws making public disclosure obligatory. Related party lending usually corrupts the credit portfolio and at times leads to huge financial losses.

Credit problems arise in cases of related parties, because systems and procedures laid down for granting credit are not followed in their entirety, maintaining an arms-length distance. Often, the related party lacks creditworthiness or the amount of credit granted is more than what is admissible under the prevalent norms or beyond the repaying capacity of the party. The terms and conditions of credit are manipulated, and relaxations and exemptions are allowed, which are not justifiable on prudential grounds and also not admissible to other customers. The problem is not confined to the credit granting process alone; it can arise at a later stage due to the leniency shown by the bank officials in supervising and following up the related party credit that impairs the

credit quality.

Related party lending is more common among banks that are privately owned or banks in the cooperative sector, which operate mostly in rural areas and serve low-profile customers. In privately owned banks, directors and other officials who exercise credit granting powers are often placed in those positions by persons who wield money power and enjoy political patronage and who want to get undue benefits from the bank. As a result, the credit granting standards get diluted. The practice is more pervasive among the cooperative banks due to the inherent flaws in the composition of the management committees, which are dominated by members who lack professionalism but enjoy political patronage, and also due to the permissive attitude of the government. In general, credit sanctions and credit rejections are not merit based in cooperative banks. The credit portfolios of cooperative banks are usually contaminated and difficult to evaluate due to the lack of transparency. In certain countries, the problem of related party lending is tackled through banking laws and regulations that prohibit sanction of credit to the relatives of directors or to the concerns in which the directors are interested. But the legislation has proved to be inadequate due to the difficulties in proving the existence of a relationship between the bank directors and their representatives and the owners of borrowing concerns or due to the lack of clear definition of controlling interest.

### Prevalence of Credit Concentration

“[Credit] concentrations are probably the single most important cause of major credit problems. Credit concentrations are viewed as any exposure where the potential losses are large relative to the bank's capital, its total assets or, where adequate measures exist, the bank's overall risk level. Relatively large losses may reflect not only large exposures, but also the potential for unusually high percentage losses given default. … A high level of concentration exposes the bank to adverse changes in the area in which the credits are concentrated.”2

Credit concentrations are grouped in two broad categories:3 Conventional credit concentration.

Concentration based on common or co-related risk factors.

Conventional credit concentrations refer to significantly large exposure to a single borrower or borrowers belonging to the same group, industry concentration, sector concentration, or geographic concentration (high volume of finance in one or two preferred locations in a country, significant cross-border

exposures in one or two foreign countries, or exposures in a group of foreign countries whose economies are strongly co-related). For example, credit concentration in the commercial and residential property market in Thailand and Hong Kong contributed to the financial crisis in Southeast Asia during 1997, and in the residential property market in the United States resulted in the U.S. financial crisis during 2007.

Conventional credit concentration also includes:

Concentration by facility type, such as fixed tenure loans, stand-by commitments, subscription to corporate debentures and bonds, purchase and discount of trade bills and checks.

Concentration of lending against the same type of collateral, such as mortgage of property, hypothecation of cars, or pledge of shares and bonds.

Concentration of loans of the same maturity.

The judgment of whether the concentration exists or not should be based on the whole range of activities that involve counterparty risk and not solely on credit exposure alone. Sometimes, banks do not have the option to avoid some level of concentration, either because they do not have access to diversified parties or do not possess skilled staff to deal with all kinds of activities. Small banks are prone to develop portfolio concentration, as they are unable to compete with large market players in certain spheres of activities, and they do not have the cushion to offer concessions on terms and conditions.

Concentration per se is not the sole criterion for rejecting credit proposals of good quality if banks take precautions to mitigate the additional risk from concentration. Some banks often draw comfort from concentration, as they believe that they enjoy core competence over their rivals in certain types of financial activities, and they have the wherewithal to build up a niche market in those areas. Bank regulators and supervisors advise banks to fix outer limits for lending to a single borrower or a borrower-group and also diversify their loan portfolio to reduce the risk of concentration. But it is often difficult for banks to reduce concentration within a specified time, as concentration can be diluted over a period. Sometimes, the benefits of diversification may not be rewarding, if the risk of potential loss from concentration is assessed to be less than that from forced diversification.

The nonconventional type of concentration risk emerges from common risk factors, or from linkages between different risk factors. It may also arise from

large exposure concentration, if there is economic or price shock, or from structured financing or asset securitization. The Asian financial crisis of 1997 to 1998 has shown that there is a strong correlation between credit risk, foreign exchange risk, and liquidity risk. The depreciation in exchange rate increased the risk of foreign banks, which had large foreign currency exposures in some of the emerging markets of Asia. The adverse exchange rate movement increased the repayment obligations of the banks’ borrowers in terms of domestic currency. Consequently, credit defaults increased and banks’ liquidity positions deteriorated. Nonconventional type of concentration risk also arises in cases of structured financing, or it may surface from securitization of the pools of assets through the leveraged special-purpose vehicles during the downturn of the economy, as it happened from securitization of residential property mortgages in the United States, particularly during 2000 to 2006.

### Laxity in Credit Supervision and Credit Monitoring

Laxity in supervision and follow-up of credit leads to faster deterioration in credit quality and increase in potential loan losses in the event of default. Various factors cause downward migration of risk rating of borrowers. Failure or laxity in postdisbursement supervision over credit increases the possibilities of downward movement in ratings. The quantum of loss on inadequately supervised credit will be more than what is shown by an internally developed credit risk model under normal circumstances, because the loss given default and the exposure at default are likely to be more than model averages. If larger incidences of downward migration of ratings are observed in some subportfolios without apparent reasons, the bank need not hasten to find exit routes for existing exposures and restrict further addition, without assessing the opportunities and the prospects of business in the concerned subportfolios. The bank should find out whether laxity in credit supervision has contributed to the downgrading of ratings assigned to the borrowers in the affected portfolios.

Credit supervision includes observance of documentation and funds disbursement procedures, monitoring and follow-up procedures, and keeping track of collateral, borrower's business, and activities. Defective and incomplete documentation, lack of vigilance by the bank over the end-use of funds, diversion of funds for unproductive or speculative purposes, manipulation of accounts through intercorporate transfer of funds by the borrowers, and the bank's laxity in tracking the condition of collateral and establishing effective

communication with the borrowers are the common deficiencies that are observed in credit administration. These types of laxities in supervision cause larger credit losses. Banks often fail to carry out timely inspection of mortgaged properties and stocks and collateral charged to them and keep track of the current condition of collateral and the erosion in value. Slackness in the periodic inspection of collateral encourages unscrupulous borrowers to tamper with the security. Frequent credit problems arise on account of failure to monitor and supervise the activities and the loan accounts of the borrowers.

### Absence of Credit Audit Mechanism

Absence of a credit audit mechanism increases the possibilities of poor credits continuing in the books of the bank. Credit audit or credit review refers to an independent assessment of the quality of new credits sanctioned by different functionaries within the organization by a team of expert credit appraisers who are independent of credit origination and credit sanction responsibilities. The scope of credit audit sometimes extends to credit exposures already existing in the books of the bank.

Credit covers all types of exposures that carry default risk, including investment in bonds and debentures that serve as credit substitutes. Credit audit assures in time the quality of credit and catches the early warning signals for remedial action. Banks establish standards for credit sanction based on relevant factors that govern the soundness of credit proposals. The purpose of credit review is to reassess the credit proposals and ensure that credits are granted in accordance with the approved policy and prescribed standard of the bank, and credit decisions are not influenced by extraneous factors or an undisclosed relationship between the borrowers and the sanctioning authority.

An effective credit audit system should recognize the need for an early review of new credit exposures and ongoing reviews of existing exposures. The floor limit of exposures for compulsory credit audit will vary between banks due to differences in sizes and business activities and exposure-size distribution of credits. Audit of new credits should cover at least large value exposures and take place soon after sanction, as late review reduces the options for credit enhancement. Audit of credits that already continue in the books of the bank should cover large exposures on a sample basis or turn basis.

Credit audit achieves two basic objectives of good credit administration. First, a well-established credit audit mechanism promptly identifies the loans and

advances that display early credit weaknesses and allows time for the bank to devise strategies to protect its interests. Second, the credit audit system prevents bad credits being granted by the sanctioning authorities, as they know that their actions are subject to review soon by an expert group of credit appraisers. This reduces the scope of operational risk arising from the “people” component by checking the misuse of loan sanctioning powers.

### Absence of Portfolio Evaluation System

Portfolio evaluation aims at assessing individual credit quality and potential credit losses from the portfolios. The bank will not be able to track the quality of credit portfolio if it does not undertake portfolio evaluation at regular intervals. An effective portfolio evaluation system seeks to diagnose the problem sectors and problem industries in advance and helps the bank to chalk out strategies for reduction of affected exposures. The evaluation throws lights on the problems that may develop in certain areas and indicates the manner in which the existing standards for credit acceptance should be enhanced.

Different techniques are in vogue for portfolio evaluation. An impressionistic evaluation of a portfolio can be done based on economic analysis and market reports on the sector or the industry relevant to the portfolio. An impressionistic view often provides clues as to how the credit portfolio should be restructured to avoid large-scale deterioration of credit quality. But more realistic assessment of portfolios can be done through the risk rating migration exercise and credit risk measurement models. The portfolio quality can be evaluated by tracking the migration of borrowers from one risk grade to another within the selected time zones and measuring the variations in potential losses associated with the portfolios over a period of time. The bank should evaluate the trend emerging from the portfolio analysis against its declared credit policy and restructure the portfolios if noticeable deviations are observed. The absence of a portfolio evaluation system hides potential credit problems.

## Introduction of New Products without Preparation

Sanctioning credits based on a sound due diligence process has its own merits, though it is relatively time consuming. Adoption of new techniques for

achieving accelerated credit growth without adequate preparation is fraught with greater credit risk. This is particularly true if the new credit assessment method dispenses with the comprehensive appraisal of credit to achieve quicker sanctions. Banks seek to achieve faster credit expansion by widening the range of credit products and by introducing new lending techniques, besides entering into new areas of operation. Certain credit products are complex, and dealings in these products require tailored and tested procedures for decision making. For example, dealings in unfunded and funded credit derivative products are very risky, because credit risk in these products is not always visible and identifiable. The officials who deal in credit derivatives should have special skills to assess the exact nature and the quantum of credit risk arising from each derivative transaction. It is, therefore, highly risky to introduce new credit products without setting up proper handling procedures and developing the competency to handle them.

Another issue is the adoption of new lending techniques based on credit scoring or credit ratings without going through an elaborate credit appraisal process. The new technique may include an abridged credit appraisal procedure. Credit decisions based on mechanical credit rating or credit scoring are likely to display higher probabilities of defaults. On the contrary, loans sanctioned after a genuine due diligence exercise carry lesser default probabilities, because the whole loan sanction process includes an elaborate assessment of the borrower and the project, based on subjective and objective factors, and an evaluation of the prospects of recovery under normal and deteriorating conditions. Banks are likely to suffer greater losses if they choose shorter routes for credit sanctions. The new lending techniques or procedures should be tested before final adoption. The bank can undertake a trial run of the new procedures by granting loans to a sample of borrowers, capture the incidences of default, and compare the default data with the average default probabilities on similar types of loans sanctioned in the past after detailed appraisal. If the incidences of default on new loans are on the high side, the bank should make amendments in the appraisal procedure and incorporate additional factors drawn from the due diligence process in the rating model. The trial run of the new lending techniques may take some time, but it is worthwhile in the long run.

### High Leverage to Preferred Borrowers

The capitalization ratio or the debt equity ratio is used as a yardstick to make

credit decisions and determine the size of the exposure that can be granted to the borrowers. In general, commercial banks define debt equity ratio as the ratio of total outside liabilities to equity, and term lending institutions define it as the ratio between funded debt and equity. The prescription of a benchmark debt equity ratio ensures that the borrowers have a reasonable stake in the enterprise, which induces them to run the business on sound lines and repay the bank's dues. Consequently, banks should insist on a minimum capitalization ratio.

The debt equity ratio varies according to the size of the industry and the nature and the capital intensity of the projects, and ranges from 2.5:1 to 4.0:1. The ratios for industrial projects are different from those applicable to other types of business, but most often, the difference is only marginal. Though the debt equity ratio can be made flexible for credit sanction, it will have to be within a safe range so that borrowers do not indulge in “overtrading.” It should be at levels that compare favorably with the averages maintained in the banking industry. Banks usually have a list of preferred categories of borrowers who, they believe, are financially strong and have well-organized, profitable business establishments. They often relax the terms and conditions of loans to retain the preferred borrowers in their books. Taking advantage of the bank's weakness to retain the relationship, some borrowers avail themselves of large amounts of loans from several banks without bringing in matching amounts of equity. This raises the debt equity ratio much above the safe level. Sooner or later, credit problems surface as the borrowers’ stakes in the business get diluted. In the worst case, they become bankrupt or insolvent, and banks incur large losses.

## CAUSES OF CREDIT RISK

Multiple causes lead to credit risk. The more common among them are imprudent credit decisions, deficient credit management, emergence of unexpected events, and the recalcitrant attitude of borrowers. In general, a combination of external and internal factors generates credit risk for banks. External factors relate mainly to weakening macroeconomic fundamentals, deteriorating condition of the economy, and unfavorable developments in external markets. The negative impact of these factors adversely affects the business of the borrowers, which result in reduction of income and impairment of the debt-servicing capacity. External factors like changes in government fiscal and budgetary policies, liberalization of import and export policies, imposition of trade restrictions and sanctions, or adverse movement of financial market

variables affect the quality of banks’ credit portfolios. External factors influence the economy in a large way and sometimes trigger an economic downturn. During the downward phase of the business cycle, the economic activities slow down, the volume of production and sales decrease, and the output prices fall due to the slackness in demand for goods and services. The market sentiments also affect the prices of equities and bonds. Larger incidences of credit defaults take place during the economic downturn, and the quality of banks’ credit portfolios deteriorate. Conversely, during the boom phase of the business cycle, borrowers’ income gets augmented on account of higher production and higher demand for goods and services. The borrowers’ repaying capacity improves, and the incidences of credit defaults come down. During the economic downturn, credit risk increases, and during the upturn, credit risk declines. The extent up to which credit risk will decrease or increase on account of variances in economic activities will depend on the intensity of the boom and the depression of the trade cycle, besides the duration of the cycle.

Internal factors associated with the borrowers and their businesses are the major causes of banks’ credit risk. Internal factors like business failures, financial mismanagement, lack of corporate governance, and inefficient project management generate larger credit defaults. By and large, credits for manufacturing operations and trading of goods and services constitute the major portion of banks’ credit portfolios. Lack of appropriate technical know-how and managerial experience, inefficient production processes, and poor inventory management are some of the common factors that erode production efficiency and product quality. Lack of demand for substandard goods and services and poor sales management acumen aggravate the problem further. These negative factors cause decline in the borrowers’ income, impair cash flows, and increase the probability of default. Besides, the borrowers who have obtained foreign currency loans from banks but have not taken cover for exchange risk, or who do not have foreign currency earnings by way of export of goods they produce, cause greater credit risk for banks because of the usual volatility in exchange rate movements. Dishonesty and unethical attitudes of borrowers are also one of the major causes of credit risk. Often, borrowers are reluctant to repay the loans, though they have repaying capacity. They refuse to disclose the actual status of their business to the banks with the intent of seeking favor for waiver of loans.

The internal factors and the external factors, either singly or jointly, increase the incidences of credit defaults. Other things remaining equal, the efficacy of the legal system, the attitude of the society toward the defaulting borrowers, and

the political interference largely influence the credit granting environment and the level of credit risk for the lenders.

## SUMMARY

Intensive competition between banks impairs the due diligence process for loan sanctions and gives leverage to large and financially strong borrowers to dictate their terms. Banks often skip the due diligence process and make credit decisions based on credit rating or credit scoring, which leads to credit problems at a later date.

Credit quality gets diluted if too much reliance is placed on credit rating or credit scoring, disregarding other factors relevant to the loan appraisal.

A combination of factors, which are both external and internal to the bank and the borrower, generate the majority of the credit problems.

Credit problems arise from credit concentration, undue reliance on lending against collateral, and skipping standard procedures for granting credit to related parties.

The related party credit portfolio remains cloudy due to the lack of transparency of related party transactions and the absence of relevant laws for compulsory public disclosure.

Lack of effective credit supervision results in the downward movement of counterparty risk grades and increases the quantum of credit loss. Besides, the absence of a credit audit system increases the possibility of poor credits remaining hidden in the books of the bank without receiving attention. Likewise, the absence of a portfolio evaluation system delays detection of deterioration in the portfolio for corrective action.

A strong correlation exists between credit risk and business cycle, and the extent up to which credit risk will increase or decrease on account of trade cycle effects depends on the intensity of the boom and the depression of the cycle, besides the duration of the cycle.

##### NOTES

1. The United States Financial Crisis Inquiry Commission Report, January 2011.

2. “Principles for the Management of Credit Risk,” BCBS, September 2000. For more details on credit risk–related problems, readers may refer to the original

BCBS document at Bank for International Settlements, [www.bis.org.](http://www.bis.org/)

3. “Principles for the Management of Credit Risk,” BCBS, September 2000.

## CHAPTER 7

**Identification of Credit Risk**

## MARKET RISK AND CREDIT RISK RELATIONSHIP

Volatility in market risk factors, like changes in interest rates and exchange rates, generates credit risk, as was clearly evident during the Asian financial crisis of 1997 to 1998. The debt burden of the banks’ clients, who had obtained foreign currency loans, increased substantially in terms of the domestic currency when the exchange rates depreciated appreciably, which led to large-scale credit defaults that resulted in the financial crisis. The credit risk of banks increased substantially due to the increase in interest rates and depreciation in the exchange rate.

Credit risk denotes the probability of default in meeting financial commitments, and market risk denotes the possibility of erosion in the value of assets or earnings. Between credit and market risks, it is not possible to say with certainty which has relatively greater impact on banks. It largely depends on the asset composition, the macroeconomic condition of the economy, the volatility of the financial and capital markets, and the overall operational environment. Where loans and advances constitute a significant portion of the balance sheet, and the operating environment is not conducive to the development of sound business, and the legal system in support of the lender is weak, the intensity of credit risk is likely to be of a larger magnitude.

There are certain distinguishing characteristics between credit and market risks that reveal their true nature. First, credit risk usually lasts longer than market risk because it is difficult for banks to liquidate loan assets at their option, while there are established markets for selling investment assets. The exit route for investments is far easier than that for loans and advances. Credit risk continues till the relationship with the borrower is terminated. This is more so, because credit exposures to customers take place in various forms, and one or the other exposure continues to exist for a long time.

Second, it is more difficult to make a reliable estimate of decline in the values of credit assets since market values of loan assets are not known due to the absence of a secondary market for the sale of loan assets. But decline in the values of trading book assets can be assessed with some degree of accuracy because the market for sale of sovereign securities and bonds and equities is usually active.

Third, banks can avoid credit risk on their investment portfolio to a significant extent since they have options to purchase securities issued by sovereign countries, which are free from credit risk, but they cannot avoid market risk due to the possibility of upward movement in interest rates that will cause decline in the security values. Banks have also greater options in building up their investment portfolio in keeping with the maturity pattern of their liability portfolio, as securities and debt instruments are available for varying maturities and coupons as compared to the options available for development of the loan portfolio, since needs and preferences of customers dictate the terms of loans.

Fourth, market risk can be eliminated through the simultaneous process of borrowing funds and lending the same in the same currency, protecting the desired interest spread, but credit risk cannot be avoided. If the lending rate is made to float and linked to the borrowing rate, the bank will not suffer from reduction in interest spread on account of adverse movements of interest rates. If the loan is given in foreign currency and the funds are also borrowed in the same currency from another source, there will be no net impact on the lending bank on account of movements in exchange rates. But if the counterparty defaults in repaying the loan, there will be problems for the lending bank, as it will have to repay the funds to the creditor on the due date. The credit risk will continue to exist, though interest rate risk and foreign exchange risk can be avoided.

## CREDIT RISK IDENTIFICATION APPROACH

### Complications in Credit Risk Identification

Risk managers face several challenges in identifying credit risk because it remains hidden in investments and certain other types of transactions including derivative transactions. Loans and advances are the largest source of credit risk to banks, but it exists in other activities, which do not always involve lending of

funds. Banks face credit risk from acceptances, interbank transactions, foreign exchange transactions, financial guarantees, letters of credit, and derivative transactions in futures, options, and swaps. Credit risk exists in both the banking and trading books. Banking book exposures comprise loans and investments that are intended to be held on a long-term basis, and trading book exposures consist of assets like securities, bonds, debentures, equities and foreign currencies that are intended to be traded in the short term. Credit risk also exists in off-balance sheet exposures, the volumes of which are often very large. Identification of credit risk therefore covers all on-balance-sheet and off-balance-sheet exposures.

Credit risk identification involves a few complications. Banks need to resolve a few issues if they want to establish a comprehensive credit risk identification procedure. The first issue relates to the development of satisfactory methods to identify the magnitude of risk that arises from the complex ownership structure of large companies and the vastness of the geographical spread of their operations. Large companies have several manufacturing and trading establishments, and they conduct their operations through several affiliated units. In such cases, there are high possibilities of underassessment of risks, because each establishment is usually treated by the customer as a separate unit. This type of phenomenon may lead to excess credit being enjoyed by them and may result in credit diversion or lead to overtrading, which poses additional risks. Often, there is lack of transparency and disclosure by the companies of the affairs of their associate concerns or lack of clarity on the ownership and business relations between the establishments. The obligations of a large company to the affiliated units for rescue in times of distress increase the risk of the bank even though the latter has no direct exposure to the affiliated units, since the problems encountered by any affiliated unit may be transmitted to the parent. The real challenge lies in capturing credit risk from all the facilities provided to large corporations on a bank-wide basis across all the geographical locations where the customer and its affiliated concerns have dealings with the bank. Banks often make a mistake in identifying the magnitude of credit risk from the counterparty on a stand-alone basis at each location separately. They ignore the fact that the same counterparty or its affiliated concerns have dealings with them at other locations. Sanction of a facility to the parent company or its affiliated concerns or executing a transaction on behalf of them gives rise to credit risk of different dimensions and magnitude, and alters the risk profile. The segmented approach does not actually capture the level and the magnitude of credit risk faced by a bank from exposures to large corporations or exposures to

the group of firms under the control of the same management. Where an intercorporate relationship exists, the risk identification process must recognize the additional risks emerging from that relationship. The credit risk identification process must recognize the risks from each facility and each transaction on an integrated basis in order to arrive at the total credit risk from the customer-group that enjoys multiple facilities at multiple locations.

The second issue that makes it difficult for banks to identify the actual level and magnitude of risk relates to the problems that arise from the borrowing pattern of large corporations. Multinational companies borrow from multiple sources and require multiple facilities from banks. They seek credit facilities from more than one bank, partly because their requirements are large and partly because they want to broaden their relationship. They choose banks that offer the most competitive terms and conditions. Banks try to reduce the magnitude of risk by limiting the exposure size through loan syndication and loan participation. But the financials and other particulars, which were taken into consideration by the lenders at the time of processing the loan applications, may not reveal the correct picture if multinational companies borrow from multiple sources. The multiplicity of lenders also makes the position of collateral unclear. The lenders’ free access to the collateral gets restricted, and the enforceability rights get eroded. The emergence of adverse features in the accounts of the borrower in one bank may alter the risk level of other banks of the same borrower due to the contagion effect. This type of development either remains unknown to other banks or there is a time lag before they come to know about it. Banks need to recognize additional risks from exposures to multinational companies where multiple lenders are involved.

The third issue relates to the lack of satisfactory procedures to capture the total risks emerging from the wide range of facilities that large companies enjoy from the entire banking system. The companies ask for different types of fund-based and non-fund-based facilities from different banks. It is often difficult to precisely assess the total risks from large borrowers who enjoy multiple financial facilities. For example, the issue of financial guarantees on behalf of a customer may increase the level of risk on the overdraft or the loan facility given to the same customer due to the increase in exposure size or fall in the collateral coverage. Sometimes, banks may not be aware of the total facilities enjoyed by the multinational companies from the entire banking system. The challenge lies in establishing a satisfactory procedure to recognize the total risks from the package of facilities enjoyed by large customers from the entire banking system.

The fourth issue relates to the problem in establishing acceptable criteria to define credit “concentration” and the methods to estimate additional risks from it. The bank has to set up norms to identify the areas of concentration in its business and recognize the magnitude of concentration risk in the risk assessment process. Concentration risk can arise from any type of concentration:

1. credit concentration, portfolio concentration, sector concentration, investment concentration, derivatives concentration, (2) geographical concentration, (3) client concentration—single client or group-client concentration. In the normal course, banks usually address the concentration risk through prescription of risk limits. What is important in this context is that, in addressing this issue, the existence of concentration is often ignored or underplayed, and recognition of additional risks is avoided. But it is necessary for the bank to identify the areas of concentration and increase the magnitude of risks emerging from the relevant area. It is difficult to specify methods for estimating additional risk from concentration. One way will be to follow the guidelines of the bank supervisor. Another option is to ascertain the best practices in the industry and adopt similar norms to identify the portfolios where concentration exists, and to increase the quantum of risk in the calculation process by adding a fixed percentage of the total exposure in the relevant area on an ad hoc basis. This will also ensure that additional capital is maintained against concentration risk on the incremental exposure.

The fifth issue relates to the appropriateness of the procedure for risk identification in respect of small exposures. If the bank has a large number of customers who have been sanctioned loans for small amounts, it is difficult to assign a risk grade to each borrower as the task is voluminous. A simple identification procedure based on an asset-pool approach may serve the purpose. The pool approach will have to be based on the homogeneity of borrower characteristics and the similarity of purpose, assets, or collateral. But in cases where the bank's credit portfolio consists predominantly of large exposures, the risk identification has to be on an individual customer basis. Banks that have a mix of large and small customers may adopt a combination of individual customer-based approaches and asset-pool-based approaches.

### Credit Risk in Problem Loans

Loans that are not repaid on the due dates are classified as overdue loans. These loans are categorized as nonperforming or nonaccrual for accounting purpose

after a specific period, which usually varies from one month to three months or sometimes six months. Loans that show adverse features, but which are not in a nonperforming state, are usually marked as watch category loans or problem loans. Credit risk is deemed to have materialized in the case of nonperforming or nonaccrual loans, while it is about to materialize in the case of watch category or problem loans. Credit risk focuses on the probability of default, and it is conveyed in terms of the level of risk associated with an exposure before default, such as high, moderate, or low. The level of risk indicates the quantum of loss that may arise in the event of default. Credit risk is a dynamic concept, and over a period of time, the level of credit risk associated with a particular credit exposure will increase, decrease, or remain the same. It is therefore necessary to recognize higher risk from problem loans. An important task in managing credit risk is to identify problem loans before default and initiate measures to improve their health.

## CREDIT RISK IDENTIFICATION PROCESS

### Credit Risk from Loans and Advances

Loans and advances usually constitute the largest item of the assets of commercial banks. They grant loans and advances to different types of counterparties, from individuals to sovereign governments, and for several purposes; and to several economic sectors, like the industrial sector, service sector, trade sector, agricultural sector, and export-import sector. Large-value loans are granted for financing infrastructure projects or large-value assets, such as aircraft and ships. Small-value loans are given for a variety of purposes that include personal needs. Again, the loans and advances are given for varying periods—short-term, medium-term, and long-term. Due to these multiple characteristics of loans and advances, credit risk is recognized as the most obvious, most frequently occurring, and most voluminous risk of commercial banks. Consequently, it is necessary for banks to allocate a large amount of resources for credit risk management.

The degree of credit risk is not identical in all types of loans and advances, and at least three factors influence the degree of risk. The frequency and the intensity of credit risk vary in accordance with the constitution of the counterparty, the

purpose of loans and advances, and the maturity period. The bank's customers, who are more strictly regulated by provisions of law than those who are unregulated or unorganized, observe better financial discipline and greater transparency in dealings and are less likely to default on loans and advances. For example, a corporate customer has several obligations to perform under the provisions of the Companies Act. It is legally required to observe corporate governance codes and conduct, adhere to standard accounting practices, maintain the transparency of its dealings, and make substantial disclosure of its business affairs. On the other hand, the provisions of laws governing individuals or sole proprietors, partnership firms, and other forms of constituents, like trusts, are not so strict. Consequently, these types of customers have the tendency to breach the codes of conduct, manipulate accounting standards and block transparency in dealings. Obviously, therefore, credit risk from the noncorporate constituents is greater than that from the public and private limited companies. In some countries, banks are directed through government regulations to make a minimum percentage of loans and advances to target customers, who are usually poor and who pursue small business and agricultural activities. Loans to these categories of people, who are unorganized, illiterate, and inexperienced, usually carry higher credit risk.

The second factor that generates credit risk of varying intensity is the purpose of the loans and advances. In general, the purpose of the loan is more important than the person who takes the loan, that is, “what for” is more significant than “to whom.” Where loans are granted for productive purposes, say, for production of goods and services or purchase of machinery or setting up infrastructure projects like power plants, there is certainty of income generation for repayment of the loan. The degree of credit risk is relatively low because of the self- liquidating character of the loans. But where loans are granted for speculative purposes or unproductive purposes, income generation is uncertain and often inadequate, and it is linked to the occurrence of favorable events. In these types of loans, the degree of credit risk is higher and the chances of default are greater. Thus, loans granted for productive purposes carry a lesser degree of credit risk than those granted for speculative and consumption purposes.

The third factor is the maturity period of loans and advances. The longer the maturity period of a loan, the greater will be the credit risk associated with it. This is because the more distant the future, the greater the amount of uncertainty is. More uncertainty signifies greater risk. The internal and external factors, which cause fluctuations in business volume and income level, are more likely to

manifest themselves in some measure over a longer time horizon. Short-term advances that are granted for working capital purposes and are renewable half- yearly or annually carry lower risks than those associated with medium-term and long-term loans.

It is necessary to be cognizant of these three factors that generate credit risk of varying degrees and intensity in the development of models for credit risk rating.

### Credit Risk from Investment

Credit risk in investment refers to the probability of committing default by the counterparties in repaying the amounts due on the financial instruments like securities, bonds, and debentures, and in the event of default, the amount of loss that the bank may incur on the investments. Besides the risk of default in repayment of the principal due on the financial instruments by the counterparty on the redemption date, credit risk in investment also includes the risk of erosion in the value of the investment assets before default on account of issuer-related problems, like deterioration in the financial position of the issuer. This is in contrast to the market risk in financial instruments where the values of the investment assets decline due to the movement of market risk variables like interest rate and exchange rate. The New Basel Capital Accord requires banks to hold additional capital against credit risk in financial instruments.

In our attempt to identify credit risk from investment, we are looking at the investment portfolio of commercial banks that invest funds in fixed income financial instruments for appreciation of capital and earning of interest. Investment activities of commercial banks are mainly confined to funds management and investment management, and credit risk in investments can be identified from the internal or external rating of the issuer or the financial instrument. Banks draw comfort from the quality of the financial instruments from the ratings assigned by the external rating agencies without assessing the reliability and competency of the agencies or cross-checking external ratings with internally generated ratings. They also make investment decisions based on their own risk assessment when ratings are not available. For many banks, investments in corporate bonds and debentures constitute a significant portion of total assets, partly because the clients show preferences for credit substitutes (subscription to bonds and debentures) in lieu of direct credit lines and partly because the banks themselves look for better avenues of earnings as interest margins on loans start shrinking. But banks often fail to take serious note of the

element of credit risk involved in various types of financial instruments. Unrated financial instruments offer high returns, but they carry high credit risk. Where the investment portfolio consists of a large amount of unrated financial instruments, banks are exposed to a high level of credit risk.

### Credit Risk from Off-Balance-Sheet Exposure

Credit risk in off-balance-sheet exposures refers to the possibility of loss that a bank may incur on account of default by the counterparty in performing obligations or honoring commitments under agreements or contracts. Off- balance-sheet facilities are provided through different types of financial instruments. The exposures do not involve parting of funds in the beginning, but in the event of failure by the counterparty to perform its duties and obligations or honor its commitments, the bank is forced to meet the liabilities immediately or incur costs to honor its own commitments. Banks assume contingent liabilities under off-balance-sheet transactions. The instruments contain an element of credit risk, as the assumed liabilities may devolve on the bank due to the failure of the counterparty to perform contractual obligations. Common off-balance- sheet items are financial guarantees, letters of credit, acceptances and endorsements, standby commitments and other financial instruments with similar characteristics, and derivative transactions.

Different types of off-balance sheet exposures carry different levels of credit risk. The off-balance sheet items can be broadly classified into four groups:

* 1. Guarantees, letters of credit, warranties, indemnities, and performance bonds.
  2. Irrevocable commitments with certain and uncertain draw-downs.
  3. Market-related transactions such as foreign exchange, interest rate, and stock index–related transactions.
  4. Customer claims arising from advisory services, management, and underwriting functions.

The relative degrees of credit risk arising from different types of off-balance- sheet instruments differ in their intensity and can be broadly grouped into three categories of credit risk.

In “The Management of Banks’ Off-Balance-Sheet Exposures” (March 1986),1 the BCBS has suggested the classification of off-balance-sheet activities into three categories of risks:

1. “Full risk”: “where the instrument is a direct credit substitute and the credit

risk is equivalent to that of an on-balance-sheet exposure to the same counterparty.”

1. “Medium risk”: “where there is a significant credit risk but mitigating circumstances which suggest less than full credit risk.”
2. “Low risk”: “where there is a small credit risk but not one which can be ignored.”

Examples of full risk category instruments are guarantees and acceptances, which act as direct credit substitutes and carry credit risk equivalent to that of a loan. Sale of assets to a third party where the transaction is with recourse and the bank retains the credit risk is a full credit risk category transaction. Financial instruments, which can perform different types of functions, should be bracketed in the respective risk category in accordance with the characteristics of their function. In other words, instruments that work as direct credit substitutes should be treated as equivalent to loans and categorized as having full credit risk. Irrevocable commitments, which are binding on the bank, will involve full credit risk. Where the assets are sold under the “repo” (asset sale and repurchase agreements) arrangement and the asset in question is certain to come back to the selling bank, the latter continues to bear full credit risk on the assets sold. Since there is a possibility of failure by the counterparty to the repo to deliver the asset, an additional credit risk equivalent to the replacement cost of the asset involved in the repo will have to be counted. In respect of outright forward purchase, full credit risk will have to be recognized.

Credit risk from documentary letters of credits should be placed under the medium-risk category because of their short tenure and collateral protection. Indemnities, warranties, and performance bonds, though they are similar in characteristics like guarantees, may be put in the medium-risk bracket because they do not work as direct credit substitutes, and the chance of credit risk materializing is dependent on the ability of the third parties to meet their obligations. Another reason is the lower quantum of loss experienced by banks on these types of instruments. In other words, credit risk from off-balance-sheet exposures where the instruments pose substantial risk, but there are risk- mitigating circumstances suggesting less than full risk, can be placed under the “medium-risk” category. Unconditional standby facilities, note issuance facilities, and revolving underwriting facilities carry moderate degrees of credit risk. In the case of the first type of facility, the bank is compelled to lend at the customer's request, and in the cases of the latter facilities, the bank acts as the “underwriter.” These instruments should be placed at least in the medium-risk

category.1

There are certain types of transactions where the banking practices are such that they pose medium to small credit risk. For example, in respect of bills of exchange purchased or discounted under a letter of credit, which has been confirmed by another bank, or trade bills that have been endorsed or accepted by another bank, credit risk represents exposure to a bank and can be categorized in accordance with the risk rating of the latter bank. The advisory, agency, and underwriting functions are such that these do not give rise to credit risk, but there are possibilities that the bank may be drawn to payment of claims on account of negligence or breach of obligations. Banks are often complacent in extending off-balance-sheet facilities and do not always carry out due diligence exercises and observe as much caution as they do in the cases of on-balance- sheet exposures, primarily because of the contingent nature of liabilities under off-balance-sheet exposures. But credit risk in off-balance-sheet exposures can at times be substantial and inflict very large financial losses.

### Credit Risk from Derivatives

#### Derivatives Characteristics

Derivatives are complex financial instruments devised by financial engineers and linked to hypothetical assets, events, or other benchmarks. They are unique risk management tools, and banks use them to hedge risk or transfer risk to a third party. They have no independent values; their values are derived from the underlying assets or the benchmark indicators. Derivative products enhance the depth of the market and liquidity of the underlying instruments. Financial derivatives are contracts of contingent nature whose values are derived with reference to the underlying assets like currencies, commodities, bonds, or benchmarks like interest rates, exchange rates, stock prices, and indexes. Derivatives offer scope for high leveraging or gearing, and enable dealers to offer transactions of high volume with small amounts of funds as the backup. Consequently, though derivatives are off-balance-sheet transactions and reflect imaginary events, they have the potential to inflict the same economic consequences that occur under genuine transactions.

Derivatives are of two types—standardized and customized. Standardized derivatives are those that have simple specifications, widest appeal to the market participants, and an easy offset route. Customized derivatives are those that are

designed to meet the specific needs of an end user. Traders and speculators use derivatives to meet their specific purpose. Traders follow the “buy low, sell high” principle to make a profit, but speculators take advantage of volatility in price movements and seek to make windfall gains through the use of derivative products. Banks use derivatives to protect themselves against the loss of, or erosion in, the value of assets. Derivative products are based on expected movements in foreign exchange rates, interest rates, equity prices, and stock indexes. The most commonly used derivatives are forward rate agreements, options, swaps, futures contracts, and hybrid instruments.

Derivative products have highly flexible characteristics and can be designed in accordance with the intended duration of the contract and the desired size of the transaction. Abundant scope of unusual flexibility in the design of derivative products offers a platform to the market players to inject high volatility that can pose greater risk in trading, which may not have arisen under the normal market behavior. Derivatives can be linear and nonlinear in character. It is possible to hedge a risk in two ways. One way is to book a transaction at a fixed price and hold on to it till the maturity. This will enable one to protect the cash flows against fluctuations in market prices. This type of derivative product is called linear derivatives. Forward rate agreements, forward contracts, interest rate swaps, and financial futures are examples of linear derivatives. The other way is to protect the erosion in the value of financial assets against adverse movement in market variables through purchase of a derivative product called an option. The option holder has the discretion to exercise his or her right under the option, if he or she is likely to suffer a financial loss or cash flow is impaired. Options are nonlinear derivatives as the payoffs depend on how the market price moves around the strike price and the agreed time horizon.

#### Derivatives Risks

Credit risk in derivatives refers to the chances of default by the counterparty to make payments on the obligations implicit under derivative transactions that have taken place between him or her and a bank, and the amount of potential loss that the bank may suffer from the deal. All types of derivatives do not give rise to credit risk; rather, in many cases they carry market risks (foreign exchange risk and interest rate risk). Since under derivative transactions the underlying principal is only notional, there is usually no exchange of principal. But the bank remains vulnerable, as it is exposed to an unintended or unexpected exposure in the event of default by the counterparty.

In the case of forward interest rate agreements, the obligation is to pay only the interest differential on the agreed notional principal and hence, the credit risk for the counterparty is relatively low. In the case of interest rate futures, credit risk is shifted to the Futures Exchange where futures are traded and settled. Credit risk on interest rate swaps is relatively greater, as the commitments of the counterparty involve a series of interest payments that spread over multiple settlement periods. Derivative transactions in options also give rise to an element of credit risk. Under currency options, a bank buying the option has the discretion to exchange (or not to exchange) a specific amount of currency for another currency at a predetermined rate within a specified time period. The bank is exposed to credit risk as the counterparty may fail to perform its side of the contract.

Derivatives are risky products and can cause financial disasters. Financial mishaps have occurred in the past not on account of basic defects in the design of the derivative products, but due to the lack of understanding of the complex nature of the products and unauthorized use of the products by unscrupulous traders or lack of control on use of derivatives beyond prudential limits. The sale of credit default swaps, an “over-the-counter” (OTC) derivative, on an enormous scale by large investment banks, bank holding companies, and insurance companies in the United States to provide protection against default on payments to investors on mortgage-related securities exposed them to an unusually high level of risks without the backup of adequate capital and reserve funds. When the mortgage defaults rose sharply, these large financial institutions incurred massive losses from derivatives exposures and faced a severe liquidity crisis that finally led to financial meltdown in the United States in 2007.

### Credit Risk from Interbank Exposure

The ownership pattern, the objectives, and the functions of different kinds of banks within the financial system vary. The laws and regulations governing different types of banks and financial institutions differ in content and rigorousness. The extent of rights to mobilize deposits from the public also varies between different types of banks. Some banks, because of their restricted access to public deposits and restricted banking license, are not subjected to intensive supervision by the central banks or the supervisory authorities. Government-owned commercial banks are directed by the government to perform certain social obligations, like granting credit to the poorer sections of

the society at soft terms. Certain provisions of the banking laws and regulations are not applicable to them. Consequently, exposures to these banks are not risk free despite sovereign ownership. Many of the privately owned commercial banks fall in the high-risk category because of their aggressive business targets, hidden related-party credit portfolio, and expectation of high returns on capital. Cooperative banks, which are quite large in number in some countries, do not often observe merit-based principles of governance. They are also immune to certain regulatory and legal actions that are feasible against commercial banks. Cooperative banks are concurrently governed by both the general banking laws and regulations and the cooperative societies’ acts and rules. Their by-laws permit them to conduct business usually with their members. Specialized banks, like export-import banks or agricultural development banks, are not permitted to accept deposits from the public payable on demand, and hence are not subjected to intensive supervision by the supervisory authorities. In view of these varying characteristics, the risk profiles of banks differ, and so also the financial soundness and the degree of solvency. Consequently, the exposures of one bank to other banks are neither risk free nor do they carry same level of risk. It is, therefore, necessary to recognize the risk from interbank exposures.

Banks in the normal course of their business enter into several transactions with other domestic banks as well as overseas banks. They deal in the call money and term money markets, trade-bill finance market, capital market; and foreign exchange, derivatives, and real estate markets. Banks lend large amounts of money to other financial sector participants, place deposits with them for specific periods, and provide financing against trade bills, both domestic and foreign, under the letters of credits issued or confirmed by other banks. They also lend money to third parties against the counter-guarantee of another bank and undertake repo and reverse repo transactions on securities between themselves. They deal in the sale and purchase of securities and foreign exchange as well as act as seller and purchaser of derivative products. One bank owes money to other banks under the payment and settlement systems. All these interbank transactions reflect substantial exposures by one bank to another within and outside the country. Interbank settlements are not free from uncertainties, since one bank may fail to honor its commitments to another bank in time.

The possibility of one bank defaulting on its liabilities to another bank is recognized as an element of credit risk in interbank dealings. The New Basel Capital Accord also reckons banks, financial institutions, and securities firms as

one class of counterparty that carries credit risk. The New Basel Capital Accord even recognizes differences in the financial strength and soundness of different classes of banks and suggests for assignment of risk weights of different values in accordance with their financial standing or rating by the rating agencies. A bank will therefore have to classify its exposures to other banks and financial institutions into different risk grades in accordance with the financial soundness or rating of the counterparty and recognize varying levels of risks from exposures to each category of institution.

### Credit Risk from Intercountry Exposure

Internationally active banks have substantial cross-border exposures in the form of direct lending and investment. These exposures carry a country risk element of credit risk as the counterparties are based in other countries. The exposures can be to the sovereign governments themselves, either in the form of investment in their securities or by way of direct lending for specific purposes, or to the entities owned by the government, or private corporate and other parties in the form of project finance, working capital finance, and trade bill finance. These exposures carry an element of country risk due to certain inherent characteristics of cross-border dealings.

Country risk in cross-border exposures arises due to the possibilities of deterioration in the economic conditions of the resident countries of foreign borrowers. If the macroeconomic fundamentals are unstable and the financial system is fragile in those countries, volatilities in interest rates and exchange rates can set in any time. If adverse movements in interest rates and exchange rates take place, the ability of borrowers to service the bank's loans will be affected, and the incidences of default by borrowers located in the relevant countries will substantially increase (for example, the financial crisis of 1997 in Southeast Asian countries). The country risk will be high if the economy of the country is structurally fragile, bankruptcy laws are weak, insolvency procedures are cumbersome, and the enforcement of bank's rights in courts of law is time- consuming. Country risk can also arise due to the political change in a country whereby the new government may refuse to honor certain types of claims, including those of foreign banks. Further, intercountry exposures of banks are subject to sovereign risk, if the sovereign governments are under the rehabilitation program of international agencies in respect to their debts. Sometimes, the sovereign governments themselves may deny their obligations

and claim immunity from settlement of foreign debts.

The other forms of credit risk from cross-border exposures are transfer risk and currency risk. Transfer risk is a core component of country risk, and arises mainly because of restrictions imposed by a government on the use of foreign exchange, either due to the shortage of foreign exchange reserves or the balance of payments problem. The borrower may be able to honor the contractual obligations in local currency, but the lending bank suffers a loss due to the restriction or ban on conversion of domestic currency into foreign currency.

Currency risk refers to the losses suffered by the lending bank in converting the payment received in the domestic currency of the overseas borrower into foreign currency on account of depreciation in the value of the borrower's domestic currency during the tenure of the loan. If the loan is repayable in foreign currency by the overseas borrower, the obligations in terms of domestic currency will increase due to the adverse exchange rate movement, which may induce him or her to default in payment. Thus, the currency risk gets converted into credit risk.

### Transaction Settlement Risk

Settlement of financial transactions contains an element of credit risk because one of the parties may fail to complete or settle the transaction in accordance with the agreed terms. If one side of the transaction is settled but the other side fails, one of the parties will incur a loss that may be equal to the principal amount of the transaction. Even if there is delay in settlement, there is an element of loss involved in it, as the delayed process will deprive one of the parties of the investment opportunities that could have been seized if the transaction had been settled on time. This kind of credit risk is a part of the “settlement risk.” What will be the level of credit risk on account of a failed transaction or delayed settlement of the transaction is determined by the specific arrangements for settlement. Factors that govern such arrangements and have a bearing on credit risk include the timing of the exchange of value, payment/settlement finality, and the role of intermediaries and clearinghouses.2

## SUMMARY

Credit risk and market risk are closely linked since volatilities in market risk factors generate credit risk. The bank's asset composition indicates which of

these two risks will have greater impact.

Credit risk consists of transaction risk, counterparty risk, and portfolio risk and exists in both the banking and trading books. It is a dynamic concept, and over a period of time, the level of credit risk associated with the same credit exposure usually changes.

Identification of credit risk from exposures to multinational companies is complicated because of the links with the affiliated units they own, the multiplicity of locations at which they operate, and the multiplicity of credit facilities they enjoy from several banks. An integrated approach is essential to capture credit risk from multiple facilities provided to large multinational corporations at multiple locations.

The degree of credit risk is not identical in all types of loans and advances. It varies in accordance with the nature of the counterparty, and the purpose and the maturity period of loans. Exposures to unregulated customers, or for unproductive and speculative purposes and longer maturity periods carry a higher degree of credit risk.

Banks should be seriously cognizant of the credit risk involved in their investment portfolio. Where the investment portfolio consists largely of unrated financial instruments, banks are exposed to a high level of credit risk.

Different types of off-balance-sheet exposures contain different degrees of credit risk, either full, medium, or low. Dilution of due diligence procedures for extension of off-balance-sheet facilities to customers enhances credit risk, even though these do not involve outflow of funds when the transactions take effect.

Credit risk from derivative products is usually low, since under derivative transactions the underlying principal is only notional. But unauthorized use of derivative products by unscrupulous traders or lack of control over the extensive use of derivatives by operational staff can cause significant losses. Risks from the total derivative portfolio should be identified in an integrated manner.

Banks should classify their exposures to other banks and financial institutions into different risk grades in accordance with their financial soundness or their rating, and recognize varying levels of risk from exposures to each category of institutions.

Intercountry exposures carry an element of credit risk, since economic conditions in a country can deteriorate at any time, or a government may deny its liabilities on foreign debts or impose restrictions on conversion of domestic currency into foreign currency. Cross-border exposures give rise to country risk,

transfer risk, and currency risk.

##### NOTES

1. “The Management of Banks’ Off-Balance-Sheet Exposures,” BCBS, March 1986. The exposition in this paragraph is based on the views and observations made by the committee in this document. For further details, readers may refer to the full text of the document at the BIS web site ([www.bis.org/bcbs).](http://www.bis.org/bcbs))
2. “Principles for Management of Credit Risk,” BCBS, September 2000.

## CHAPTER 8

***Credit Risk Rating Concept and Uses***

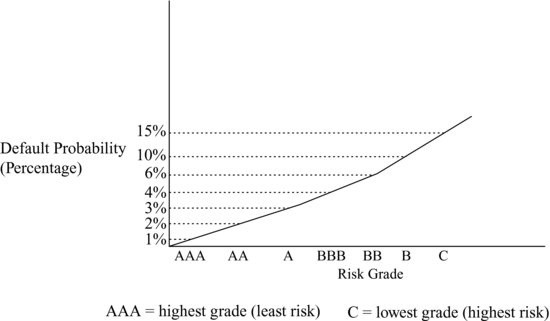
## CREDIT RISK RATING CONCEPT

Credit risk rating (CRR) communicates the relative degree of credit risk associated with a facility or a counterparty. The CRR framework captures the levels of credit risk in a granulated form, and the rating conveys the relative degrees of risk in terms of the probabilities of default for different types of exposures and counterparties, and the potential losses that are likely to arise in the event of default. CRR measures the risk inherent in an individual credit exposure and makes a meaningful differentiation between counterparties in terms of the risk levels they pose to the bank. The rating indicates whether an exposure carries high risk, moderate risk, or low risk and conveys the relative degree of safety inherent in an exposure, such as high safety, adequate safety, or low safety. In a granulated rating framework, the ratings are usually denoted through a combination of alphabets. Many banks have highly calibrated rating frameworks where marginal differences between the rating grades are denoted by adding positive or negative signs after the rating grade, such as AAA+, AAA–, AAA. The principle of rating implies that the higher the rating grade (signifying lower risk or greater safety), the lower is the probability of default. The principle is explained in the diagram in Figure 8.1.

This is an illustrative example. The diagram indicates risk grade default probability as shown below:

|  |  |
| --- | --- |
| **Risk Grade** | **Default Probability (%)** |
| AAA | 1 |
| AA | 2 |
| A | 3 |
| BBB | 4 |
| BB | 6 |
| B | 10 |
| C | 15 |

**FIGURE 8.1** Default Probability and Risk Rating Relationship



CRR is the primary indicator of the level of credit risk the bank is going to assume in the event of taking an exposure. The difference between CRR and a credit risk measurement model (CRMM) is that, while CRR indicates the level of risk (high, moderate, low, etc.), CRMM shows the probable amount of loan loss (amounts in dollars) from the credit exposure or the portfolio. These two tools are the two successive stages of the credit risk measurement process. The first stage is the establishment of a credit risk rating framework (CRRF) for assignment of rating, and the second stage is the development of CRMM for quantification of the loss amount. The loss estimated through the CRMM will be realistic if the rating derived under the CRRF is accurate and represents the bank's actual risk perception about the facility or the counterparty.

## CREDIT RISK RATING USES

CRR is the primary tool for credit risk management and guides the bank in making informed and prudent decisions on deployment of funds. The bank's risk management philosophy, risk appetite, credit risk limits, credit risk policy, and business strategies have links with the principle of CRR, since the risk-grade position of total credit exposures must be known for managing credit risk. CRR can be put to a variety of uses to strengthen the credit risk management process. The following section identifies important areas in which CRR can be used as a tool for better credit management.

### Selecting Credit

CRR is a handy tool for selection of credits at the entry point. The bank's lending policy should specify the minimum standards for credit selection, which will include the minimum rating of a borrower or a facility that will be acceptable at the entry point. Credits are sanctioned by the bank's personnel at different locations in accordance with the powers delegated to them. Under the traditional method of lending, the appraisal of a borrower, to a certain extent, is dependent on a few subjective factors. In view of these subjective elements in credit appraisal, there is a possibility of adverse selection of borrowers. The assignment of rating at the entry point will, to a great extent, eliminate the possibility of the wrong selection of borrowers and ensure the quality of credit selection at various levels of the organization.

### Measuring Incremental Risk

The total credit risk of the bank is not static and goes on changing in line with the developments taking place within and outside the economy that have positive or negative impact on the bank. While it is necessary for the bank to know the overall quality of its total exposure, it is equally important to find out how the risk profile will alter with the addition of new customers or sanction of additional facilities to the existing customers. CRR is such a device that helps in estimating the absolute risk and the incremental risk from additional and new exposures. The admission of new customers alters the credit risk profile of the bank, and the extent of alteration will depend on the credit risk ratings awarded to the new customers at the entry point. The consequential change in the risk- grade-wise distribution of total exposures will indicate the amount of incremental loss that may arise on account of facilities sanctioned to new customers. Likewise, it is possible to measure the incremental risk from additional credit facilities sanctioned to an existing borrower. First, the rating should be revised after taking into account the additional facilities sanctioned to the borrower, and then, the quantum of potential losses should be estimated separately in respect to the existing facilities and the aggregate of credit facilities after sanction of additional facilities. The difference in the potential loss from the exposures before and after sanction of additional facilities will represent the “incremental risk from additional exposure.”

Let us suppose that the bank has total credit exposure of U.S. $100 million to a customer who has been assigned a “Grade A” (low risk) rating. Further suppose

that the average probability of default for “Grade A” rated exposures is 3 percent, loss rate given default is 40 percent, and exposure at default is 90 percent (signifying that low-risk-rated borrowers do not usually draw the sanctioned credit limits to the full).

The potential loss percentage on the exposure to the customer is estimated at: PD × LGD × EAD = 3% × 40% × 90% = 0.03 × 0.4 × 0.9 = 0.0108 or 1.08%

(ignoring the risk component “effective maturity,” as maturity factor is built

into the rating model).

The estimated potential loss on the exposure of U.S. $100 million = $100 million × 1.08% = U.S. $1.08 million.

Let us assume that the bank sanctions an additional credit facility of U.S. $20 million to the same customer and the risk rating changes to “Grade BBB” (moderate risk), on account of the larger size of the exposure and changes in objective and subjective risk factors that have gone into the compilation of the risk rating of the customer. Let us further assume that the average probability of default (PD) for “Grade BBB” is 4 percent, the average loss rate given default (LGD) is 50 percent, and the exposure at default (EAD) is 100 percent (signifying that a moderate-risk-rated borrower usually draws credit limits to the full at the time of default).

The potential loss percentage on the total exposure is estimated at:

PD × LGD × EAD\* = 4% × 50% × 100% = 0.04 × 0.5 × 1 = 0.02 or 2%

(ignoring the risk component “effective maturity”).

The estimated potential loss on the aggregate exposure of U.S. $120 million =

$120 million × 2% or U.S. $2.40 million.

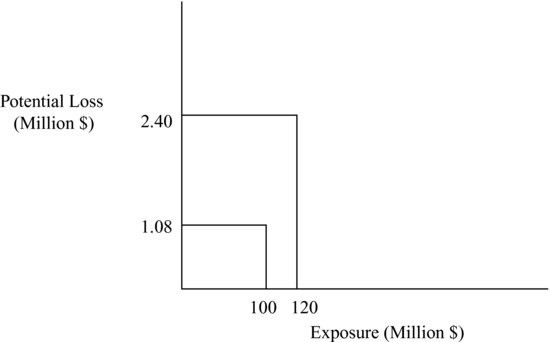
\*Using the formula given in the New Basel Capital Accord.

The incremental potential loss on account of the increase in exposure by U.S.

$20 million is U.S. $1.32 million ($2.40 –$1.08 million). If the risk rating of the borrower had not changed after sanction of additional facilities, the loss rate would have remained unchanged at 1.08 percent of the exposure and the potential loss would have been U.S. $1.296 million. In the same manner, incremental risk from exposures to new customers can be estimated. We may note that the higher the risk grade (lower risk) assigned to the customer, the lower will be the quantum of potential loss from the exposure.

The position of incremental loss is shown in Figure 8.2.

**FIGURE 8.2** Incremental Loss from Additional Exposure



### Fixing the Exposure Limit

Banks establish maximum exposure limits both for individual borrowers and the borrower-group, which are usually called “single exposure” and “group exposure” limits. Banks define a borrower-group as the group of entities that are owned by the same promoters or that function under the direct or indirect control of the same management. Bank regulators specify in general the maximum single exposure and group exposure limits in terms of a fixed percentage of the bank's capital funds. In addition to the single exposure and the group exposure limits, bank regulators prescribe a prudential limit on the aggregate of large exposures. Banks are required to define large exposure in relation to their capital funds and keep the aggregate of large exposures within the prescribed ceiling. Usually, banks observe some element of flexibility in fixing the exposure limits within the outer limits specified by the bank regulators. In deciding this flexibility, CRR can be used as a guiding device.

Sound risk management practices require some flexibility in fixing maximum exposure limits. Variation in exposure limits can be made in accordance with the risk rating of the counterparty and the purpose of the loans. There is a strong case for setting up a lower exposure limit for high-risk borrowers and a higher exposure limit for low-risk borrowers. Banks can link exposure norms with the ratings and prescribe risk-grade-wise exposure limits for the single borrower and the borrower-group. A parallel move will be linking the loan sanction powers of

different functionaries with the risk rating of the customers. Loan managers can be delegated variable powers in accordance with the risk rating of the customers, based on the principle of higher powers for low-risk rated customers and vice versa.

### Assessing Credit Concentration

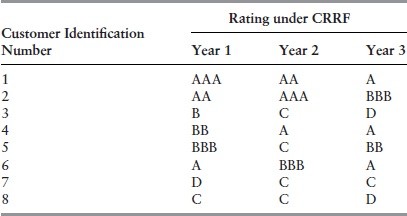
Credit concentration in any form can cause significant problems to a financial institution during periods of economic slowdown, volatility in financial markets, or disturbances in macroeconomic fundamentals, and can inflict large losses. But credit concentration to a reasonable extent in certain areas of business may not be threatening under all situations. Banks can create a niche market for themselves and develop concentration in lending to a certain extent in that market, if they have core competence or specialization in the relevant area. For scientific risk assessment of a bank's credit portfolio, it is necessary to have a mechanism to measure the intensity of risk from concentration in any subportfolio. CRR is one such important tool that can be relied upon to evaluate the concentration risk.

The assignment of risk rating to every borrower in the credit subportfolio where concentration exists will indicate the overall quality of that subportfolio. If low-risk and moderate-risk exposures constitute the bulk of the total exposure, the subportfolio can be considered healthy, despite concentration. A scientific evaluation of each subportfolio based on ratings over a period of time will indicate whether there is potentially dangerous concentration in any subportfolio. If there is an urgent need for dilution of concentration, the relative quality of each subportfolio will also point out the possible areas for diversification. Subportfolios consisting of loans granted for acquisition of residential properties against the mortgage of property are considered low risk as compared to volatile real estate subportfolios. Banks often build up concentration in the residential housing sector, because the risk from most of such borrowers is generally low. The repayment of residential housing loans is tied up with stable sources of income from salary or established business, and the prospect of marketability of the collateral is better. The use of CRR for portfolio evaluation and assessment of concentration makes the risk management process less vulnerable.

**TABLE 8.1** Eight-Scale CRRF—Implication

|  |  |
| --- | --- |
| **Rating Symbol** | **Risk Level** |
| AAA | Very low risk |

|  |  |
| --- | --- |
| AA | Marginal risk |
| A | Low risk |
| BBB | Moderate risk |
| BB | Fair risk |
| B | High risk |
| C | Very high risk |
| D | Default |

**TABLE 8.2** Counterparty Rating Migration

### Tracking Risk Migration

Banks need to review the quality of their credit portfolio from time to time. Portfolio review will indicate whether the quality of the exposures in a particular subportfolio is improving or deteriorating over time. The portfolio quality is assessed by tracking the movement of risk ratings assigned to the borrowers that constitute a subportfolio at regular intervals, say, at quarterly or half-yearly intervals. CRR is a tool for tracking the rating migration of borrowers. Risk migration will indicate whether the level of risk from exposures to counterparties has increased, declined, or remained the same during the successive periods. The improvement in ratings, called the rating upgrade, and the deterioration in ratings, called the rating downgrade, signify lower and higher quantum of potential loss in the event of default.

The interpretation of ratings, that is, the level of risk associated with the rating, is shown in Table 8.1, and the rating migration of counterparties is shown in Table 8.2.

Table 8.2 shows that customer 1, who was assigned the AAA rating at the entry point in year 1, was awarded rating AA in year 2 and rating A in year 3. This shows that the quality of credit exposure to customer 1 has gradually

deteriorated in a three-year time zone. The risk level has increased from very low risk to low risk, signifying a higher probability of default, higher quantum of potential loss in the event of default, and higher capital requirement under the New Basel Capital Accord due to an increase in the percentage of risk weight. Customer 4, who was originally assigned rating BB in year 1, has moved to rating A in year 2 and retained the same rating in year 3. The quality of the bank's exposure to customer 4 has improved from the fair risk to low risk category, signifying a lower probability of default, lower quantum of potential loss in the event of default, and lower capital requirement. Likewise, customer 3, who was assigned rating B (high risk) in year 1, slipped into rating D (default) in year 3, implying that he defaulted in his obligations to the bank within two years. The downgrading of the loan to grade D means that the bank is required to classify it as nonperforming, and as a consequence, there is loss of income on the loan and erosion in net profit on account of the loan loss provisioning requirement and the need for higher capital. The exposures to individual counterparties under each portfolio can be rated over a period of selected time zone and rating-wise distribution of exposures compiled for each portfolio. The data can be analyzed to assess how the quality of credit assets under each portfolio has moved over the chosen time period. CRR is thus an important tool for risk migration analysis of borrowers.

Migration analysis indirectly helps in cross-checking the accuracy and integrity of the CRR. The accuracy of CRR implies that there will be gradual migration in the rating assigned to a counterparty over a reasonable period of time under normal circumstances. There will not be abnormal deviations in ratings assigned to the same counterparty over the successive years. Under normal circumstances, the risk-grade distribution of total credit exposures at the corporate level over two or three successive years should not depict accelerated improvement or deterioration in credit quality. Loans can, however, abruptly deteriorate in quality under abnormal circumstances, for example, during a downturn in the economy or high market volatility. If a good number of borrowers, who were originally assigned a low or moderate rating, migrate to the default category over one or two years under normal market conditions, it is apparent that the CRRF is defective. In such a situation it is necessary to undertake a case-by-case analysis of the ratings; recheck the risk factors, the scores, and the weights that are used for computation of ratings; and make necessary modifications in the CRRF. This is, in effect, the back-testing and the validation of CRR. CRR methodology can help the bank in improving the

quality of credit portfolios through identification and gradual liquidation of high- and very high-risk exposures and acquisition of low-risk exposures.

### Deciding the Loan Exit Point

Where counterparty exposures are large, banks prefer to apportion the credit limits among themselves either to avoid client concentration or reduce the intensity of risk. Banks take shares in large exposures either through loan participation or loan syndication. The arrangement for loan participation or loan syndication is most often done by a prime lender or a sponsor bank, which is designated as the “lead bank.” The latter generally takes the major share in the exposure and monitors the compliance by the borrowers with the terms and conditions of the loan and the financial discipline. In practice, it is the prime lender or the sponsor bank that undertakes the due diligence of the credit proposal and assigns a risk rating. The other banks usually accept the assessment done by the lead bank. However, sometimes the banks that take a share in the loan exposure also undertake independent appraisal of the credit proposal. The participating banks, if they have internally developed credit risk rating models, can assign a risk grade to the customer and track the health of the exposure through the rating migration technique. The independent assignment of ratings over successive accounting periods will indicate the movements of the borrower's rating and the time frame within which a possible downgrade is likely to take place. A risk-sensitive bank will pick up the warning signals from a rating downgrade, evaluate the quality of the exposure in the light of its risk management philosophy and loan sanction standards, and quit the syndicate in time to avoid large loan losses. CRR is a valuable tool that helps banks to decide not only the exit point of syndicated loans, but also the exit points of loans where the bank is the sole credit provider.

### Fixing Loan Prices

The level of credit risk varies in accordance with the type of the counterparty, the purpose, the duration, and the nature and structure of the credit facility. CRRF established by the bank captures these varying characteristics and produces counterparty ratings or facility ratings. The rating indicates the level of risk and the relative safety associated with a credit exposure, and conveys the relative probability of default associated with different risk grades. It is necessary for banks to recoup the losses resulting from defaults committed by borrowers in

repaying the loans and advances to remain solvent and continue in the business. The principle of loan pricing is that the pricing of any risky asset must reflect the return on a risk-free asset plus a risk margin. The risk margin must be adequate to compensate the bank for the loss of money from risks that materialize in part or full. Banks should therefore fix norms for determining the amount of additional money that they should recover from customers on account of the assumed risk. The exposure to one customer may be riskier than that to another. CRR helps in differentiating customers in terms of the relative levels of risk and adjusting the loan prices in accordance with the varying degrees of risk.

### Measuring Business Performance

Banks lend funds through direct credit lines and by way of investment in bonds and debentures and stand as surety on behalf of customers. Banks build up different portfolios based on business planning and strategy, business capability, and risk-bearing capacity. For allocation of capital and optimization of return on assets, it is necessary to evaluate the relative performance of different business lines. One of the ways for evaluating the efficiency of different business lines is to compare the risk-adjusted returns on capital employed in those business lines. Risk-adjusted return is the net return from a given business line (net income – (expected and unexpected losses)) expressed as a ratio to the capital employed in that business line. The bank can map different activities and products into different business lines in conformity with the accounting requirements, and evaluate the performance of different business lines in terms of the risk-adjusted returns.

First, ratings should be assigned to all counterparties who have been granted credit facilities under a business line and then the risk-grade-wise total should be taken. This will show the distribution of total exposures in a business line as per the risk rating scale adopted by the bank. Thereafter, the risk-grade-wise potential losses should be calculated through the credit risk measurement models and aggregated to arrive at the potential loss that may arise from each business line. The risk-adjusted net return on capital employed in each business line should be derived, using the potential loss associated with it as an input, and compared to assess the relative profitability. But various types of risks associated with the activities and the products falling within a business line are intertwined and cannot be dealt with in an isolated fashion for measuring efficiency. It is therefore necessary to take into account the potential losses arising from market

and operational risks associated with a business line to judge the relative profitability. However, the returns on capital deployed in different business lines, like corporate finance, trade finance, commercial banking, and retail banking, where credit risk is the major risk, can be computed after adjusting for potential loss arising from credit risk and compared to ascertain the relative profitability, ignoring the potential losses that may arise from market and operational risks. This will be a rough indicator for the evaluation of business lines, as sometimes market or operational risks associated with a business line can be high.

### Validating Loan Loss Reserves

Banks create loan loss reserves in accordance with the regulatory guidelines and in conformity with the standard accounting practices. Bank regulators generally prescribe a minimum quantum of loan loss reserves and provisions against the deterioration in asset values. The minimum quantum of loan loss reserve is a product of three variables:

1. The age of the defaulted (nonperforming) loan.
2. The value of collateral.
3. The prospect of recovery expressed as a percentage of outstanding dues.

The regulators require banks to maintain two types of reserves and provisions

—general loan loss reserves and loan-specific provisions. The general loan loss reserves serve as a cushion against the possibility of losses on loans that can occur in future. These reserves are not earmarked against known losses in specified assets and are calculated at a fixed percentage of the total loans and advances. The quantum of general loan loss reserves on standard (performing) loans and advances is usually not based on the rating of individual counterparties or exposures. These are treated as free reserves and therefore qualify for inclusion in Tier II capital under the New Basel Capital Accord. On the other hand, specific provisions are created against deterioration in the values of identified assets or a subset of assets. The specific provisions are not freely available to meet general loan losses, which arise in the loan portfolio subsequently, and therefore do not qualify for inclusion in the Tier II capital.

The bank supervisors and the bank auditors, whether external or internal, usually assess the adequacy of loan loss reserves during the course of bank examination. The ratings assigned to credit exposures serve as the benchmark for deciding the adequacy of loan loss reserves. The risk-grade-wise bifurcation of total loans and advances indicates the quantum of exposure in a particular risk

grade. For example, it shows how much of the exposures are held in the AAA rating grade, how much in the A or B or C grade. Prudent accounting practices require that that the general loan loss reserve, which is calculated at a fixed percentage of performing loans, should not be less than the aggregate of expected losses from all standard category loans and advances. CRR is a handy tool for validating the general loan loss reserve. For determining the adequacy of provisions against specific loan assets, like problem loans, watch category loans, or nonperforming loans, an assessment of the diminution in the value of the identified loan assets is needed. Even here, the assignment of rating under an internal rating system will generate the expected loan loss figure from a given exposure and serve as the benchmark for cross checking the adequacy of provisions made after assessing the decline in the value of the assets. CRR methodology thus helps the bank management in setting up a scientific loan loss provisioning system. The bank supervisors and the bank auditors can use CRR as a tool for validating the adequacy of loan loss reserves and provisions.

## CREDIT RISK RATING PRINCIPLES

The internal risk rating models and the methodology for rating vary between banks. Different models exist for rating different counterparties and different types of exposures. The Basel Committee on Banking Supervision has recommended that a bank, to be eligible to adopt the Internal Rating-Based Approach for credit risk assessment, “must demonstrate to the supervisor that it meets certain minimum requirements at the outset and on ongoing basis. Many of these requirements are in the form of objectives that a qualifying bank's risk rating systems must fulfill. The focus is on banks’ abilities to rank order and quantify risk in a consistent, reliable and valid fashion. The overarching principle behind these requirements is that rating and risk estimation systems and processes provide for a meaningful assessment of borrower and transaction characteristics; a meaningful differentiation of risk; and reasonably accurate and consistent quantitative estimates of risk.”1

A bank can outsource credit risk rating models or develop its own models. In either case, the models must be based on certain minimum principles so as to meet the bank supervisors’ criteria for acceptability and qualify for capital adequacy assessment under the New Basel Capital Accord. In the long run, it is beneficial for banks to have their own rating models. The broad principles that banking institutions should consider in developing their internal rating models

are described in the following paragraphs.

### Differentiation in Risk Perception

The credit risk rating differentiates between borrowers and facilities in terms of the levels of risk they pose to the bank. The rating identifies whether the exposures carry low risk (high safety), moderate risk (moderate safety), or high risk (low safety). The differences in risk grades can be quantified in terms of the probability of default and loss rate given default, or in terms of risk weights to be assigned for assessment of regulatory capital. The differences between two immediately preceding risk grades assigned to borrowers or credit facilities, when compared with another risk grade, get reflected by way of lower probability of default, higher recovery factor in case of default, and lower risk weights for capital requirement. For example, counting A as the base risk grade, the probability of default for risk grade AA should be lower than that for risk grade A and for AAA still lower than that for AA. The position will be reversed in case of two succeeding rating grades. The probability of default for risk grade BBB should be higher than that for risk grade A, and for BB still higher than that for BBB. The risk grades assigned under the rating model should be so granulated that they make meaningful differentiations in risk perception and risk quantum as credit quality declines. If a customer has been assigned the AAA rating by a bank, which signifies very low risk, which is the best rating in its rating framework, the top management and market perception is that the probability of default is extremely low for such a customer under normal market conditions, and if the transaction characteristics have also been factored in the computation of the rating, the loss rate given default will also be low. On the other hand, if a customer has been assigned the C rating in a seven-scale rating framework, which is the worst rating in the nondefault category, the risk perception is that the probability of default is very high for a C-rated customer and in the event of default, the loss to the bank is likely to be large.

### Borrower Characteristics and Transaction Characteristics in Rating

The Basel Committee on Banking Supervision in the document on the New Basel Capital Accord has stipulated that “a qualifying IRB rating system must have two separate and distinct dimensions:

* 1. the risk of borrower default, and
  2. transaction specific factors.”2

The first dimension of the rating system is that separate exposures to the same borrower should be assigned the same risk grade irrespective of the differences in the nature and characteristics of specific transactions, except under certain specified circumstances. If country transfer risk pertaining to exposures in foreign currencies is involved or guarantee protection to a transaction is available, different risk grades can be assigned to different exposures to the same borrower. But this exception allowed by the Basel Committee does not appear to be a sound proposition. We may take the view that it is sensible to assign the same risk grade to all facilities to a borrower irrespective of facility-wise credit enhancement or risk mitigation characteristics, since a borrower who commits default in respect of one facility is likely to commit default in respect of all facilities sooner or later, and also because the bank has a general lien on all collateral against the total debt of the customer.

The second dimension of the rating system is that the rating should reflect the transaction-specific characteristics, such as quantum and quality of collateral, creditor seniority, or product type. The first dimension of the rating system focuses on the chances of default by a borrower who has been assigned a specific risk grade; the second dimension focuses on the extent of protection available to the bank in the event of a default. But, from the risk management perspective, it is erroneous to assign different risk grades to different facilities extended to the same customer, whether the facilities are granted at the same time or at different times. A rating system that incorporates both the borrower- specific and transaction-specific characteristics is more meaningful. Where a borrower has been sanctioned multiple credit facilities, it is better to assess in an integrated manner the borrower's ability to service all the credit facilities as and when obligations arise during the currency of the facilities, rather than assessing repaying capacity for each facility in an isolated manner. A credit risk rating that conveys the overall risk of total exposure to a customer is safer than the one that measures risk associated with a particular facility. Even where facility rating is in vogue for making a decision on a particular facility, the bank has to take an overall view of the customer.

### Transparency of Rating Criteria

The introduction of the “Third Pillar—Market Discipline” in the New Basel

Capital Accord is a unique feature of the revised framework. The third pillar requires banks to make qualitative and quantitative disclosures on risk exposures and risk assessment process. Under the qualitative disclosure on credit risk, banks are required to include a description of the internal rating process separately for five distinct portfolios (relating to each class of asset specified in the New Accord) in their disclosure framework. The description shall include, among others, the definitions, the methods, and the data for estimation and validation of probability of default, loss rate given default, and exposure at default, including assumptions employed in the derivation of these variables.3 The rating system internally developed by a bank must include specific definitions of each rating, the criteria taken into account for compilation of ratings and assigning a specific rating grade to an exposure, and the process by which the specific risk grade is derived. The definitions and criteria should be documented so that third parties or persons unconnected with the rating process clearly understand the mechanism of the rating assignment and are in a position to evaluate the appropriateness of the ratings.

The criteria for assigning a rating should be consistently applied across the organization to achieve uniformity in ratings for all borrowers and all facilities posing similar risk to the bank. The information and inputs utilized in the rating process should be comprehensive with a view to achieving uniformity in the rating done by different personnel across the organization at different geographical locations. The criteria for ratings should be consistent with the bank's internal lending standards and the policies and procedures that deal with problem loans or recalcitrant borrowers. In brief, the rating system must fulfill at least the following four objectives:

* + 1. Consistency in the application of criteria for rating compilation.
    2. Clarity of definition of each rating grade.
    3. Comprehensiveness of information and financial data used for the rating.
    4. Compatibility of the import of the rating with the internal lending standards.

### Integrity of the Rating Process

The rating assigned to a customer is the basis for sanction of credit. Consequently, the integrity of the rating process assumes tremendous significance for the bank's top management as well as the bank supervisors and the auditors. If the ratings are to be accepted as realistic and reliable, the rating process should meet at least two basic requirements. First, an independent

evaluation of the rating process should be in place, and second, the rating grade assigned to a borrower by loan sanctioning officials should be vetted by higher officials and frequently updated. “Credit policies and underwriting procedures must reinforce and foster the independence of the rating process.”4

The working of the rating system should include a rating approval and rating endorsement process. Assigned ratings, particularly relating to large exposures, should be reviewed by persons unconnected with credit sanction. The rating assignment and the rating endorsement process should be included in the bank's procedures for lending and reflected in the credit policy. Ratings should be revised or endorsed, preferably biannually or at least annually, and in any case, reviewed at a time when certain developments take place that have an impact on the borrower's business and income. Review of customer rating is essential when material developments, such as changes in the ownership pattern, organizational structure, or decline in volume of business and income and the value of collateral takes place. Annual updating of ratings is more reliable as the data on borrowers’ business and income are available annually. Besides, the annual financial statements are dependable as it is obligatory for the customers to get the results audited by the external auditor at the end of the financial year. If the exposures are large or fall into the high-risk category, more frequent reviews of ratings should be done.

The reference date for review of counterparty ratings may relate to the date on which the borrowers are required to publish financial statements and other particulars in compliance with the stock exchange regulations or other applicable laws. If facility rating is also in vogue, the rating shall be reviewed whenever market conditions change, as volatility in market risk factors affects the value of collateral and the probability of default, loss rate given default, and exposure at default. The validity of the regulatory capital assessment based on the Internal Rating-Based Approach will largely depend on the accuracy and the integrity of the credit risk rating process. Besides, the rating is an indicator of the kind of follow-up actions that a bank needs to take to manage credit exposures. The depth, the intensity, and the frequency of supervision and follow-up of credit are closely linked with the risk grades assigned to borrowers. The worse the rating grade, the more frequent and the more intensive should be the supervision of credit.

### Quantitative Estimation of Risk

The Internal Rating-Based Approach for credit risk estimation specifies that the internal risk rating system of banks should fulfill the basic objective of quantifying risks in a consistent manner. The rating system conveys the risk in terms of the level of risk, such as low, moderate, and high risks. This is a generalized form of risk perception; it does not convey the actual quantum of risk in numerical terms associated with low, moderate, and high risks. For example, if a customer is enjoying a credit line of U.S. $1 million from the bank and is assigned risk grade A, it only signifies that the bank is facing low risk. It does not convey the amount of potential loss the bank is likely to suffer on the exposure of U.S. $1 million in the event of default by the customer. The potential loss can be quantified if historical data on the risk components, that is, the probability of default (PD), the loss rate given default (LGD), and the exposure at default (EAD) are available.

For measurement of potential loss from credit exposures, the bank has to build up historical data on PD, LGD, and EAD for each rating grade (AAA, AA, A, etc.) and for each asset class (corporate, sovereign, banks, etc). Once the data have been built up and validated through the back-testing and stress-testing process, each rating grade will indicate the amount of expected loss that can occur on an exposure in the relevant asset class. In this way, it is possible to determine the amount of potential losses, asset-class-wise and risk-grade-wise. But the accuracy of potential loss figure will depend on the comprehensiveness of rating inputs and the consistency in application of rating criteria.

The consistency of the output produced by risk-rating models can be maintained if two requirements are met. First, it is necessary to achieve objectivity in the computation of rating and maintain uniformity in the application of the rating criteria. Second, the rating model should be appropriate to the type of business activity and the purpose of credit. Uniformity in model- generated output is essential as many persons will have the responsibility of credit sanctions within the organization at different geographical locations. The uniformity and accuracy of ratings can be achieved, on the one hand, through standardization of risk factors that go into the compilation of rating grades for different activities, different exposure sizes, and different purposes, and on the other, by systematic development of norms for assigning scores in accordance with the extent and intensity of risks. The standardized risk factors and scoring norms, which will be applicable across the organization, will produce the same rating grade for the same type of borrower or exposure, even though ratings will be compiled by different persons and at different locations. The risk factors will

have to be suitably modified for assigning ratings to counterparties at overseas centers.

## SUMMARY

Credit risk rating measures the risk inherent in credit exposures and makes a meaningful differentiation between counterparties in terms of the risk levels they pose to the bank or the relative degree of safety of the exposure.

The principle of rating implies that the better the rating grade, the lower is the probability of default. A rating is reliable if it does not show abnormal deviations over a reasonable period under normal circumstances.

Banks can decide entry and exit points of loans, measure potential losses from additional and new exposures, and track the rating migration of borrowers over a period of time through the use of CRR. They can assess loan concentration, fix exposure limits, and delegate loan sanction powers in keeping with the risk profiles of counterparties through the application of CRR.

Banks can use CRR to evaluate the performance efficiency of business lines, fix loan prices, and determine the quantum of loan loss reserves and provisions.

Models and methodology for rating may vary between banks due to differences in counterparty and facility characteristics. Counterparty rating is more meaningful than facility rating and consequently, the bank should incorporate both the borrower-specific and transaction-specific characteristics in the rating methodology.

It is erroneous to assign different risk grades to different facilities extended to the same customer. A risk rating that conveys the overall risk of total exposure to a customer is safer than the one that measures risk associated with a particular facility.

Risk grades included in the rating framework should be so granulated that they make meaningful differentiations in risk perception and risk quantum as credit quality declines. The criteria for rating assignment should be transparent and applied consistently across the organization, and the integrity of the rating process protected, if the CRR framework is to be accepted by bank supervisors and external auditors.

The New Basel Capital Accord requires that the risk rating system developed by banks for credit risk estimation should fulfill the basic objective of quantifying risk in a consistent manner. The consistency in assignment of ratings

can be achieved through standardization of risk factors and scoring norms.

##### NOTES

1. New Basel Capital Accord, paragraphs 388, 389.
2. New Basel Capital Accord, paragraph 396.
3. New Basel Capital Accord, Table 6.
4. New Basel Capital Accord, paragraph 424.

## CHAPTER 9

**Credit Risk Rating Issues**

## RATING PRACTICES IN BANKS

A rating is a summary indicator of the risk inherent in credit exposure and conveys the potential loss the bank may suffer if the borrower commits default in repaying its dues. The quantum of loss is never static because the default probability and the loss intensity vary from time to time on account of changes in the political and economic environment and the market conditions. It is difficult to design a credit risk rating framework (CRRF)1 that will apply equally to all types of borrowers and all types of banks. Practices vary among banking institutions in framing the design of credit risk rating models. The Models Task Force of the Basel Committee on Banking Supervision carried out a survey of around 30 institutions in G-10 countries in 1999 to gather information about the “best practice” and the “sound practice” in the internal rating systems design. The committee found that “there is no single standard for the design and operation of an internal rating system.” There were “both similarities and differences in the structure, methodology and application of internal rating systems at banking institutions.” Broadly, the commonality among the banking institutions in the credit risk rating system related to (1) the types of risk factors taken into account for risk compilation, (2) the assignment of ratings based on the assessment of the counterparty, and (3) the use of ratings for different facets of risk management. The major area of dissimilarity was found in the methods followed by banks for compilation of loss characteristics data for each risk grade. The survey revealed that banks generally considered similar types of risk factors in assigning a rating, though there were some variations in the relative importance and mix of the quantitative and qualitative risk factors. Banks made an overall assessment of the counterparty for assignment of rating, irrespective of whether the rating was to be assigned to the borrower or the facility. And ratings were used largely for the same purposes, namely, limit setting, loan pricing, and management reporting.2

## DESIGN OF THE RATING FRAMEWORK

In preparing the design of a realistic rating framework, it is necessary to resolve certain issues relevant to the rating process. The first issue is that the CRRF should meet the requirements specified under the Internal Rating-Based (IRB) Approach of the New Basel Capital Accord for assessment of regulatory capital. The New Accord permits banks to make greater use of internally developed models for capital assessment to cover credit risk. The rating derived through the CRRF should reflect the varying levels of risks between different risk grades and enable the bank to map risk weights in accordance with the varying risk characteristics. The ratings assigned to the counterparty and the risk weights assigned to each risk grade will facilitate compilation of risk-weighted assets for the calculation of the capital charge for credit risk. The bank supervisory authority should endorse the validity and the reliability of the CRRF and certify that it generates appropriate ratings for making a realistic assessment of credit risk.

The second issue is that the CRRF should provide a mechanism to identify the loss characteristics associated with each risk grade. The framework should enable the bank to track the rating migration and generate default probability data with respect to rated borrowers within the chosen time span. The risk grades included in the CRRF should be the basis for compiling historical data on risk components (PD, LGD, and EAD), which can be used for calculation of expected losses and unexpected losses for assessment of economic capital.

The third issue is that the CRRF should not work in a negative way and hamper the bank's credit growth process. This can happen if the rating criteria are not realistic or are very negative, and pessimistic views are taken in assessing risk factors that are included in the rating process. The CRRF is not intended to replace the bank's traditional process of loan appraisal. Rather, the rating should be used as an additional tool for decisions on loans.

There is no uniformity in approach between banks in framing the design of rating models, because they differ in their views on the relative importance of risk factors that go into the compilation of a rating and the relative balance between the quantitative and qualitative risk factors. Whatever approach is chosen, the internal rating system established by the bank should broadly meet the requirements of the IRB approach prescribed under the New Basel Capital

Accord.

The key issues that influence the design and operation of an internal credit rating system are:

1. Conceptual issues.
2. Developmental issues.
3. Implementation issues.

Banks need to clearly understand and handle these issues so that the rating process works smoothly across the organization. The methodology should be user friendly and the staff handling credit should understand the import of the rating. The bank has to ensure that there is no divergence in the application of the rating methodology by different staff positioned at different places. There should be no variations in the final output, other things remaining the same. These issues are analyzed briefly in the ensuing paragraphs.

## CONCEPTUAL ISSUES

### Choice of Approach for Risk Factor Selection

The first conceptual issue relates to the choice of approach for recognition of risk factors for the computation of the credit risk rating (CRR). There are two approaches for rating: the “through the cycle approach” and the “current condition approach.” The difference between the two approaches lies in the choice of time horizon for the selection of risk factors that go into the CRR computation. The question is: Shall we compute CRR based on the risk factors that currently exist, or shall we consider risk factors that can arise over a much longer time horizon?

The stability of the financial system is highly dependent on the health of the economy, and the system becomes vulnerable when macroeconomic instability sets in. It is difficult to predict the frequencies at which trade cycles are likely to occur in an economy. Banks suffer during the depression or recession phase of the trade cycle, but it is difficult to foresee when the depression phase is likely to begin in an economy or how long the depression phase will last. Apart from the uncertainty in the time of occurrence of trade cycles, the intensity and the spread of the cycle are also determinant factors. When depression sets in, it need not necessarily encompass the whole economy; it may affect one or two sectors in the economy like the real estate sector, the steel sector, or the automobile sector.

There can be some spillover effects between certain sectors on account of correlation. During the period of depression, the manufacturing and the trading units, which have borrowed funds from the banking system, suffer due to decline in sales and profits. The downward trend in their operations generates negative impact on cash inflows and impairs the loan repaying capacity. During the recessionary phase, the default probabilities increase and the collateral values decline. The issue that arises for consideration in this context is how to factor this phenomenon of economic downturn in the risk rating process because of some complications.

The first complication is that the criteria for the selection of risk factors for rating are different under the “through the cycle” approach and the “current condition” approach. The criteria followed by the international credit rating agencies are not transparent, but it is presumed they generally follow the “through the cycle” philosophy under which the borrower's projected condition in a depressed economic scenario is factored into the rating process. The assessment of the financial condition of the borrower is done at the worst point, assuming the “bottom of the cycle scenario,” or under serious stress situations. The risk grade is assigned according to the risk posed at that time. But the ratings assigned by international credit rating agencies pertain mostly to large corporations or multinational companies operating in developed economies and prominent financial and capital markets, and the ratings need not always be appropriate and reliable, as was evident from the incorrect ratings assigned to mortgage-backed securities that were soon downgraded, which contributed to the

U.S. financial crisis in 2007. In any case, it is sensible to assume that the “through the cycle approach” is more relevant for large companies that have higher tolerance against economic shocks. This approach may not be appropriate for rating small and medium enterprises, which constitute the largest group of clients of many banks, because their tolerance level is low against economic shocks, and too rigorous criteria for rating may make them ineligible for credit, though their projects and businesses can be financially viable. In these cases the current condition approach seems to be more appropriate. Nonetheless, the external agencies’ ratings are handy and can be accepted if criteria for ratings are transparent and reliability is endorsed through empirical evidence. In respect of overseas counterparties, banks may use their own internal country risk ratings (sovereign ratings) and other published data and modify the external agencies’ ratings, wherever considered necessary.

The second complication is that the downturn in the economy may not take

place in a definite cyclical order. The downturn may be engineered by market- related factors and not by a slump in demand for goods and services. It may be confined to one or two sectors in the economy. The Asian financial crisis has demonstrated that there is a strong correlation between credit and market risks. The financial crisis began with the downturn in the real estate sector, but the economic instability escalated due to the volatility of market variables. The downturn did not occur in tandem with the past trend of business cycles. It is therefore difficult to anticipate the timing of trade cycles, form definite views about the characteristics associated with the cycles, and identify risk factors that can be factored into the rating process.

The surveys conducted by the Models Task Force of the Basel Committee on Banking Supervision in spring 1999 have revealed that, in general, banks evaluate the risk of a borrower or a facility on a point-in-time or “current condition approach” basis. The survey has, however, corroborated that banks consider all relevant factors in the assignment of ratings, including those that are relevant from a long-term perspective. Banks take into account longer term negative prospects even under the “current condition approach” for risk rating, but do not rely heavily on long-term projections that show improvements in the borrower's repaying capacity over time for assigning a favorable rating.

The conclusion is that banks should not place too much emphasis on the time horizon for choosing risk factors for inclusion in the internal credit risk rating models. All data and information that are relevant and available at the time of rating, including contingencies that can arise, should be taken into account. The “current condition approach” is more suitable for the bulk of the customers.

### Choice of Rating System Dimension

The risk rating indicates the relative safety of credit exposures. Some banks consider a “facility rating” for sanction of a particular facility, while some others consider a “counterparty rating” for sanction of any type of credit facility. While facility rating methodology has focused mainly on facility characteristics, counterparty rating methodology combines both the borrower characteristics and the facility characteristics. Some banks first compute the counterparty rating without considering facility characteristics, and then they modify the rating by superimposing the facility characteristics such as collateral coverage and guarantee protection. In the absence of empirical evidence on the extent of correlation between credit decisions based on facility-rating and borrower-rating on the one side and the incidence of credit defaults on the other side, it is not appropriate to conclude which is a safer practice.

In banks, extension of credit facilities takes place through different forms and under different nomenclatures. Borrowers enjoy different types of fund-based and non-fund-based credit facilities, either from a single bank or a number of banks. The fund-based facilities are in the form of fixed tenure loans, overdraft or cash credit facilities, trade bills discount and purchase, or in the form of subscription to bonds and debentures of corporations redeemable over a period of time, which are credit substitutes. The non-fund-based facilities are extended usually through financial guarantees, import and export letters of credit, or for underwriting of equities and bonds. It may be possible to base lending decisions on facility rating, if the borrower avails itself of only one type of facility from one bank. But where borrowers seek multiple credit facilities that involve a number of banks, it is not prudent to base the lending decision on a facility rating. The latter practice (bond or debenture rating) is meaningful, where the bank provides facility by way of subscription to the bonds or debentures issued by the counterparty. If the borrower needs a package of credit facilities, it is not practical to rely on facility ratings due to the likelihood that different facilities may receive different rating grades, though they relate to the same customer, who is answerable to the bank for the total debt and not facility-wise debt. Moreover, computation of ratings for different facilities may not show consistency between ratings due to the varying characteristics of facilities. The situation gets further complicated if the borrower approaches more than one bank for sanction of different types of credit facilities. Different banks may have

different rating criteria, different rating scales, and different rating models, which may not be comparable due to the bank-specific idiosyncrasies and preferences. In view of these complications and the possibilities of greater divergence in facility ratings, it is more sensible to undertake borrower rating in preference to facility rating. In fact, borrower rating is more meaningful than facility rating, since the funds lying in various accounts are fungible, and the borrower has the freedom to transfer funds between accounts and between locations, or it can manipulate the accounts to suppress unfavorable developments. The default in a facility does not occur in isolation; default in any one of the facilities usually takes place when the overall financial condition of the borrower deteriorates. Even facility rating is not done in isolation; risk factors taken into account for facility rating also include risk elements that reflect the borrower characteristics.

### Adoption of Definition of Default

A credit rating signifies the potential loss that can arise in the event of default. In preparing the design of a CRRF it is therefore necessary to set up a definition of default. When we assign a rating to a credit exposure, say the AA rating, we invariably link it with the probability of default. We try to convey as a credit analyst that the default percentage in the AA category of credit assets is low, and lower than the average rate of default for the bank as a whole. The granulation of rating scale is essentially based on the incidences of defaults in various asset categories. Consequently, the definition of default assumes tremendous significance in framing the design of the CRRF. There is no uniformity in practice among banks, and also between the bank regulators and supervisors, in determining when a credit exposure has reached the stage of default. Even the Basel Committee on Banking Supervision has given some flexibility to the bank supervisors to use their discretion in setting up a definition of loan default, keeping in view the peculiarities of local conditions.

Broadly, there are two definitions of default—the legal definition of default and the bank supervisors’ definition of default. The definition of default used in credit risk rating models can be different from that used for legal purposes. In simple terms, default can be defined as the breach of contractual obligations by the debtor to the creditor. Default occurs when the debtor is unable to meet his or her financial obligations to the creditors on a global basis on the agreed dates. In other words, the ambit of default extends to the debtor's financial obligations anywhere in the world. If the debtor voluntarily applies to a court of law for declaring him or the organizations owned by him as insolvent, or if the creditors file suits in a court of law for declaring a debtor or his concerns as bankrupt and the court upholds the applications, the default has occurred. Sometimes, the process gets delayed as bankruptcy laws differ between countries.

The bank supervisors’ definition is precise and simple. In their view, the default has occurred when the debtor (borrower) fails to repay his dues to the creditor (lender) in full or in part as per the agreement, within the specified time counting from the date the debt is due to be repaid. But the supervisors’ definition is not uniform between countries, mainly due to different prescription of the time period allowed as concession to the debtor to repay his debts. The time period is usually linked to the production and income generation cycles and the trade practices that vary between countries.

The New Basel Capital Accord defines default:

*A default is considered to have occurred with regard to a particular borrower when either or both of the two following events have taken place:*

1. *The bank considers the borrower is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realizing security (if held).*
2. *The borrower is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstanding3*

In the case of retail and public sector entity obligations, the period of 90 days can be extended up to 180 days by bank supervisors under their discretion to suit the local conditions.

In addition, the document has prescribed certain events or elements that will help bank management to determine whether a default has occurred in respect to a credit exposure.4 These events/elements are:

1. When a bank ceases to charge interest on an account in pursuance of prudent accounting policy or standard accounting practices.
2. When a bank makes provision in respect of the account due to decline in credit quality.
3. When a bank sells at a discount the credit exposure or it restructures the debt involving financial sacrifice on its part.
4. When a bank files an insolvency or bankruptcy petition in a court of law or to a competent authority.
5. When the borrower seeks protection under the bankruptcy or insolvency laws to delay or avoid repayment obligations to the creditors.

The definition of default is an important input to the rating process. It is advantageous to accept the bank regulators’/supervisors’ definition of default, which is very specific, in framing the design of the CRRF. If a borrower has been rated AAA at the entry point and commits default to the repayment obligations within a year or two, except under exceptional circumstances, it indicates that the internal risk rating model set up by the bank is not realistic.

## DEVELOPMENTAL ISSUES

### Selection of Risk Factors

A bank has to develop its own rating models, keeping in view its asset profile. The key inputs are the risk factors that go into the computation of ratings. The bank has to carefully identify the risk factors that will be valid for different types of counterparties and different types of facilities. It is not difficult to identify the risk factors for compiling ratings, because these are more or less the same that the bank officials usually consider when they carry out the due diligence exercise for loan sanction. Under the traditional credit analysis method, the bank makes an overall assessment of the risk based on a set of conclusions emerging from a detailed analysis of the technical feasibility and financial viability of the borrower's project. The focus is on the assessment of the borrower's repaying capacity under normal conditions and stress situations. In doing so, the traditional credit analyst considers all the risks that can arise till the loan is repaid. In the computation of a rating, more or less similar risk factors are considered, but in a more structured way. The difference is that risk factors are assigned numerical values after assessment of the severity of emerging risk, and later, the numerical values are aggregated to derive the rating that indicates the level of risk (low, moderate, high) associated with an exposure. The risk factors used under the traditional credit analysis method and those used under the rating method are by and large common. Usually, conservative banks do not depend solely on ratings for credit decisions. They use risk rating as an additional tool to take a final view of a loan after careful analysis through the traditional credit appraisal method. The risk rating is not a substitute for the due diligence exercise.

### Granularity in Rating

We have discussed in Chapter 8 the multiple uses of a granulated rating scale. But what should be the extent of granularity in rating? Risk management strategies and options will fall short of the requirement if we do not go beyond binary classification of loans into good and bad loans. The granulation of risk grades seeks to overcome the limitations of broad loan classifications. The objective of granulation is to set up realistic and scientific credit risk models for credit loss estimation. The most important aspects of granularity in risk grade are that:

1. The user understands the comprehensive meaning of a particular risk grade.
2. Each grade represents a set of conclusions relating to the relevant counterparty.
3. Each grade conveys the incidence of default risk associated with the exposure.

For instance, a banker who uses ratings for decisions on loans should understand without difficulty that a counterparty rated as AAA falls in the lowest risk or the highest safety category. If the counterparty is awarded the AAA rating, it is expected that the rating will endorse the following set of conclusions:

1. The counterparty is financially sound.
2. The counterparty is least susceptible to moderate business setbacks or has a high degree of sustainability in adverse circumstances and volatile markets.
3. The counterparty has a high degree of survival during economic depression.
4. The incidence of default on exposures in the AAA category is the lowest and minimal, say, 0.5 percent to 1 percent of borrowers.

### Number of Risk Grades

How many risk grades should a bank have in its internal credit risk rating system? International practices differ in this regard. There has to be a minimum number of risk grades in the rating framework so that the grades reflect the marginal variations in risk perception. In the New Basel Capital Accord, the Basel Committee has recommended that “a bank must have a meaningful distribution of exposures across grades with no excessive concentrations, on both its borrower-rating and facility-rating scales. To meet this objective, a bank must have a minimum of seven borrower grades for non-defaulted borrowers and one for those that have defaulted. … Supervisors may require banks, which lend to borrowers of diverse credit quality, to have a greater number of borrower grades.”5

The rating scale shall consist of a sufficient number of risk grades so that it is possible for the bank supervisors and the external auditors to evaluate the relative quality and the health of the bank's credit portfolio. Usually, the bank supervisors do not specify the exact number of grades; they give discretion to banks to decide the number they will include in the rating scale. The supervisors, however, expect that banks will comply with the requirements prescribed under the IRB approach.

Banks must consider that it is not worthwhile to increase the number of rating grades beyond a point, because it may not produce any additional benefit. The greater the number of rating grades, the more expensive and time consuming will be the process to collect the data and information for fine tuning the risk grades and operating the rating system. The number of risk grades that can be included in the rating scale depends on several factors.

For determining the realistic number of risk grades, banks should take into account at least the following factors:

1. Credit risk management policy.
2. Credit risk appetite.
3. Credit profile.
4. Targeted credit spreads (exposures at prime lending rate, below prime lending rate, and at prime lending rate +, ++, and so on).
5. Provisioning policy on impaired loans.
6. Local banking industry practices.
7. International best practices.

The major objectives for including a reasonable number of risk grades in the rating scale are:

1. To assign appropriate risk weights to counterparties to assess capital requirements in alignment with varying risk characteristics.
2. To distinguish one loan from another in terms of credit quality.
3. To build up historical data on risk components (PD, LGD, EAD).
4. To estimate potential losses from exposures with varying credit qualities.
5. To set up a scientific loan pricing formula.
6. To evaluate the overall health of the credit profile.

Another important objective is to identify watch category loans or problem loans. From the credit risk management point of view, a separate grade for “watch category loans” is required for close monitoring to stop the slippage of standard category loans and advances into the nonperforming category. A separate grade for sick category loans is also required for segregating at an early stage the borrowers’ industries or businesses that have become sick so that rescheduling or restructuring packages can be worked out at the appropriate time.

The grading system should be flexible so that banks can have a lesser number of grades for relatively small exposures or for personal loans or agricultural loans. For rating of large exposures, banks may have very fine granulation so that even slight changes in the material financial ratios, which are included in the rating process, cause alteration or migration in risk grades. The rating mechanism should be such that even changes in the lending environment can be factored into the rating process. The ultimate test of robustness of the grading system is that it symbolizes without ambiguity the variations in default probabilities associated with different risk grades. The proportion of loans turning bad in each risk grade within a selected time zone as seen from actual cases in the records of the bank must be around the model-generated default probability, if the credibility of the rating grades is to be accepted.

### Determination of Rating Scale

The rating scale should capture all possible states of loans in terms of their probability to move to a default state and the extent of recovery in the event of default. What is important is that a bank should document distinct criteria for assigning a particular risk grade. Each grade should convey the degree of default risk associated with the borrowers in that grade and be distinguishable from another grade in terms of the intensity of default probabilities. For example, in a eight-scale borrower rating framework, rating of a borrower in grade 1 (best rating) represents virtually no risk or the least probability of default, whereas rating in grade 7 will mean the highest risk or the highest probability of default. The calibration in the rating grade guides the bank to fix the collateral package and other terms and conditions for sanction of loans in accordance with the varying scales of risks. A bank may devise its own notations to assign risk grades to the borrowers. It can be either alphabetical, such as AAA, AA, A … C, and so on, or numerical notations preceded by the abbreviation of its name. The design of an eight-grade rating scale is suggested in Table 9.1.

**TABLE 9.1** Borrower Rating Scale

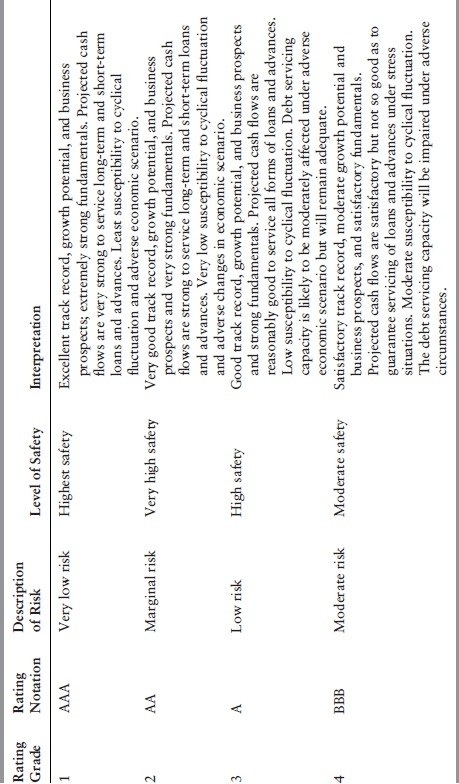
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| --- | --- | --- |
| **Rating Scale** | **Description of Risk** | **Level of Safety** |
| AAA | Very low risk | Highest safety |
| AA | Marginal risk | Very high safety |
| A | Low risk | High safety |
| BBB | Moderate risk | Moderate safety |
| BB | Fair risk | Less than average safety |
| B | High risk | Low safety |
| C | Very high risk | Very low safety |
| D | Defaulted or nonperforming loans and advances | Risk has materialized |

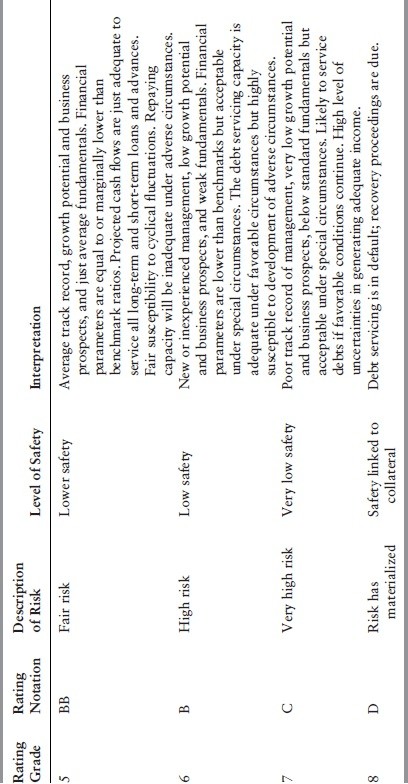
A bank may modify its rating grade by the addition of “+” or “–” (say AAA+, AAA–). It should set up a complete set of criteria for assigning a rating grade that clearly explains the characteristics of the grade with plus and minus notations. Large banks may set up longer rating scales where rating grades can be assigned “+” or “–” signs to represent minor variations in risk perception.

### Interpretation of Rating

Credit ratings convey the current opinion on the creditworthiness and financial soundness of a counterparty in relation to its total financial obligations. Ratings convey the ability and the willingness of the borrower to meet specific financial obligations on loans, overdrafts, bonds, commercial papers, and so on. Different rating grades convey different probabilities of committing defaults on the repayment obligations and differences in the levels of safety (quantum of loss that may arise in the event of default). The interpretation of different rating grades is described in Table 9.2.

**TABLE 9.2** Interpretation of Counterparty (Borrower) Rating





## IMPLEMENTATION ISSUES

Appropriate mechanisms have to be in place to implement credit risk rating

models uniformly across the organization. Large banks, which have a broad network of domestic branch offices and operate at several overseas locations, face several challenges in implementing the rating system. The questions that arise in this connection are:

Who will collect data on borrowers and initiate the rating process? Who will approve the ratings?

Will loan managers also rate borrowers to whom they sanction loans? Do all loans have to be individually rated?

Will loan managers stationed at branches have the knowledge and experience to understand the rating methodology and carry out the exercise?

What types of checks and balances exist to prevent assignment of motivated ratings?

Banks have to address a few issues to tackle the typical problems they face in implementing the risk rating models across the organization. The main implementation issues are:

Deciding the rating coverage.

Deciding the modalities for initiation and completion of the rating process.

Ensuring objectivity in rating and achieving uniformity of rating output.

Setting up procedures to avoid conflicts of interest between rating assignments and loan decisions.

Fixing responsibility for independent verification of assigned ratings. Arranging for storage, retrieval, and online connectivity of data on borrowers accessible to monitoring and controlling staff.

These issues are dealt with in the following section.

### Rating Coverage

A bank's credit assets comprise loans and advances of varying sizes to different counterparties and for different purposes and tenures. The principle of credit risk management dictates that all exposures shall be rated irrespective of size, because size-based classification of exposures has its own limitations. Large-size exposures of short tenures can be less risky than medium-size exposures of long tenures. The credit risk management process will be incomplete unless all exposures are rated. Banks, which have significantly large number of small borrowers, may not find it practical to rate all small loans because of the volume and the cost of rating, and they may decide to rate all loans above specified limits. The cutoff limits may vary counterparty-wise, purpose-wise, and tenure- wise, and will depend on the risk management policy of the bank, the average size of exposure, and the number of loans within specified ranges of limit amounts. The small loans below the cutoff limits can be grouped into homogeneous categories and assigned predetermined ratings without subjecting them to individual rating. But the assignment of predetermined risk grades to pools of small loans should meet at least two conditions, if the principle is to be accepted. The first condition is that the assigned rating to the asset-pool should display default probability and loss given default characteristics that are almost the same if individual ratings of these loans had been undertaken. The second condition is that the risk weights that will be assigned to these small loans on a pool basis for calculation of regulatory capital should be in conformity with the prescriptions of the bank supervisory authority and the requirements specified under the New Basel Capital Accord.

### Rating Approval Process

The rating approval process has to go through three stages to generate the final output. The first stage is information collection and initiation of the rating process by the front-line staff, the relationship manager, or the manager of the branch office itself, who interacts with the prospective borrower. The compilation of rating requires several pieces of information and data on prospective borrowers, and it will be advantageous if the loan application forms are designed in such a manner that they contain all the information in one place, both for rating as well as for loan processing.

The second stage relates to data processing for derivation of the rating, and the third stage to approval of the rating and modification where needed. The choice of authority for compilation and approval of the rating will depend on the organizational structure and the decentralization of loan sanction powers. Borrower rating can be undertaken at the branch office of the bank without compromising with the principle of separating the operational function from the control function, if certain minimum checks and balances are observed. A bank having a three-tier organizational structure—the branch office, the controlling office, and the head office—can have rating approval responsibility at all tiers of the administration. Each tier may be assigned responsibilities up to specified limits in accordance with the organizational status of the officials. For approval of risk rating, the application of the principle of next higher authority seems more appropriate. If the rating is compiled by the branch office manager, it should be approved/modified by his or her controlling authority, that is, the regional manager. But for a bank of large size, having a few thousand branch offices and large number of borrowers, the task will be enormous if the ratings assigned to all borrowers at the branch offices are to be ratified by the next higher authorities. From both practical and realistic viewpoints, the responsibility for approval of the credit risk rating of borrowers can be entrusted to the officials with loan sanctioning powers at different tiers of the administration up to specified limits, subject to hindsight review by the next higher authority on a sample basis. This type of arrangement will have to be subjected to surprise audit at frequent intervals and supported by a rigorous punishment system for deliberate wrongdoings. For rating very large exposures for different asset classes, though the rating process will be initiated at the branch office, the final approval of rating should rest with a committee of senior

executives.

### Rating Review

Ratings assigned to borrowers should be reviewed at periodic intervals to make credit risk monitoring effective and meaningful. Ratings should be reviewed when facilities are renewed or additional facilities are sanctioned to an existing borrower, or whenever changes in fiscal, industrial, export-import, and regulatory policies take place, or when material developments surface in the affairs or accounts of a particular borrower or borrower-group. The officials entrusted with the authority to approve risk rating within the organization are usually responsible for review and revision of the risk grade when conditions relating to the borrower change.

### Rating Output Consistency

An important implementation issue is how to maintain uniformity and consistency of rating output, because it is done by different sets of personnel in different locations across the organization. Rating grades assigned by different personnel at different geographical locations may vary even in respect of the same or similar type of borrower, though the data and information base is the same. This is because rating is a combination of subjective and objective assessment. The accuracy in rating can be ensured if subjectivity is reduced and objectivity increased. Uniformity of rating output means that the rating methodology generates the same rating in respect of the same or similar type of borrower, even though it is done by different personnel at different locations. The objectivity in rating and the consistency in assignment of rating grade can be achieved by developing norms for assigning scores to risk factors, documenting the criteria for assigning a rating grade, and familiarizing the field personnel, who undertake the rating, with the rating methodology.

### Conflicts of Interest in Rating

In implementing the rating process, the broad principle of segregating the credit sanction function from the risk rating function has to be kept in view to avoid conflicts of interest. But it is difficult to adhere to this principle by banks that have a large network of branch offices and a large number of borrowers. It is practically impossible to observe this principle with respect to small loans, since these are voluminous and spread over a large network of branch offices. This principle should be strictly observed in respect to all large and medium-size exposures where these constitute a significant percentage of the total volume of credit. Rating of very large exposures should be approved by the top management or a committee of two or three credit experts at the bank's head office, while the actual loan sanction should be the responsibility of the board of the bank, the managing director, or a committee of senior management in accordance with the loan approval policy. In respect to loans up to specified limits, the credit staff associated with the loan sanction process can be assigned the responsibility for initiation and approval of ratings, subject to appropriate checks and surprise audit.

### Independent Verification of Assigned Ratings

The assignment of risk grades to the borrowers has a few implications. Rating not only influences the decision on the loan, but also the lending rate and the collateral package. Low-risk-graded loans enjoy a lower lending rate and a softer collateral package. Consequently, possibilities exist for manipulation of ratings for personal gain or achieving higher targets through soft ratings. Banks should follow a system of independent verification of ratings by personnel unconnected with the loan sanction and loan administration process, in addition to the rating review and rating modification system. Independent verification of assigned ratings to borrowers can be entrusted to the internal audit team on a regular basis. The internal audit team is a better choice in preference to outside agencies as it ensures continuity and protects the confidentiality of the borrower's accounts; besides, the internal audit team is more accountable to the top management.

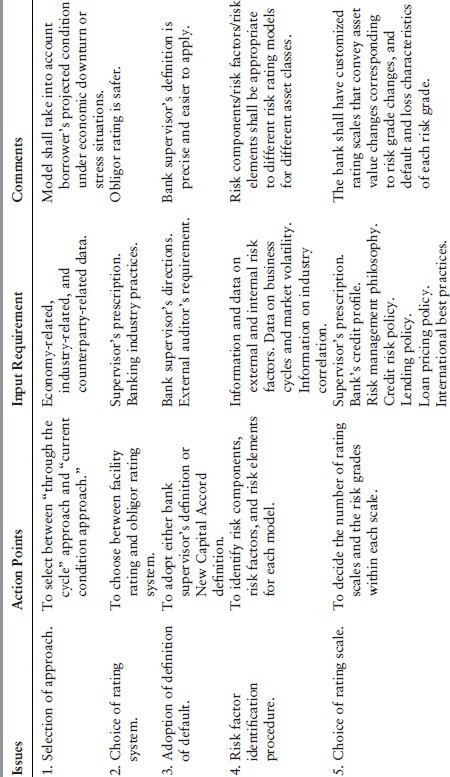
### Storage and Retrieval of Data

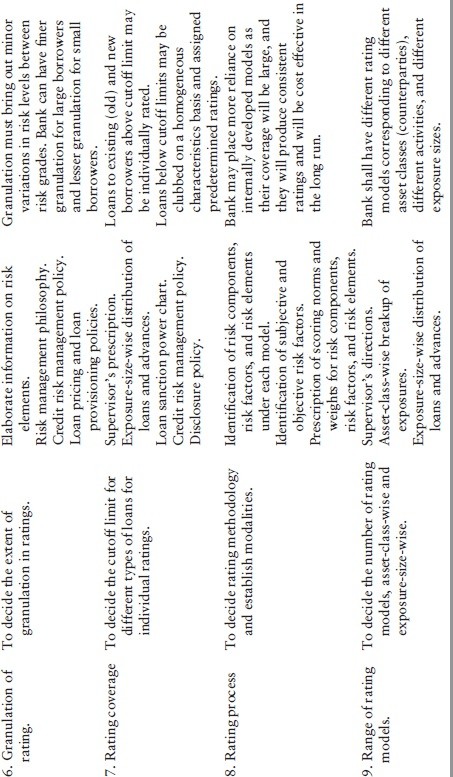
The financial data and other information on prospective borrowers required for rating are handled by bank personnel at different levels. The corruption of data at any stage can cause errors in rating. Besides, the data can be manipulated to produce a better rating grade that has implications for credit quality. It is essential to restrict data accessibility to officials across the organization and protect the integrity of data. The data entered into the computer system at the branch office or the front office should be subjected to selective verification at periodic intervals by personnel unconnected with the risk rating or credit sanction functions. This verification process assumes more significance if the bank intends to adopt the IRB Approach for credit risk assessment prescribed in the New Basel Capital Accord, since risk weights for assessment of regulatory capital are aligned to the various risk grades derived through the internally developed models, and capital relief is available on the value of admissible collateral. The integrity and the accuracy of ratings can be protected through checks on data entry and data accessibility. The particulars of collateral, which are factored into the rating process as risk mitigation inputs and which offer relief from capital requirements, will also have to be verified. The other aspect relates to the storage and online connectivity of data and information on all borrowers. It is necessary to generate risk-grade-wise breakup of total credit exposure of the bank at any point in time to manage credit risk. The retrieval of data on a real-time basis requires provision for daily feeding into the computer system the particulars relating to incoming and outgoing borrowers, and requires online connectivity between branch offices, controlling offices, and the head office. The entire set of data relating to credit ratings and credit sanction shall be made accessible only to the designated staff at various levels of the administration.

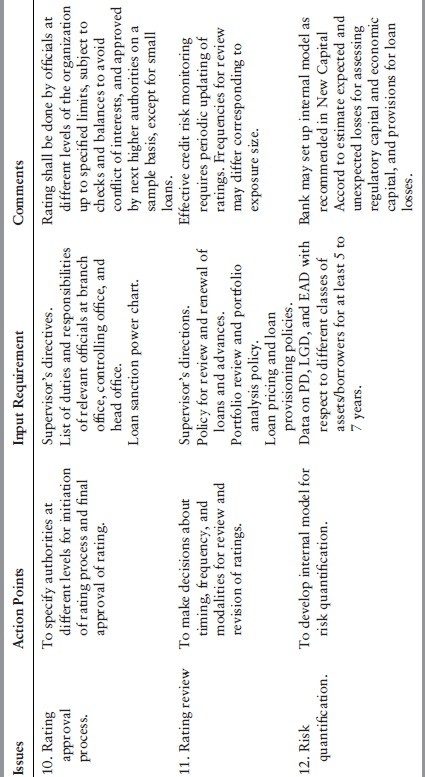
## RATING FRAMEWORK OVERVIEW

The issues involved in designing and developing an internal credit risk rating framework (CRRF) are summed up in Table 9.3.

**TABLE 9.3** Internal Credit Risk Rating Framework (CRRF) Summary of Issues







## SUMMARY

The credit risk rating methodology varies among banking institutions due to

bank-specific idiosyncrasies and preferences, and differences in rating criteria, rating scales, and rating models.

Banks can use internal rating models for assessment of regulatory capital, generation of risk-grade-wise loss characteristics, quantification of risk-grade- wise potential losses, and tracking the rating migration of borrowers.

Banks should treat ratings derived through the internal models as an additional tool for credit decisions and not as a substitute for due diligence. Banks need to resolve certain conceptual, developmental, and implementation issues in preparing the design of the rating framework.

Conceptual issues relate to determination of the time period for selection of risk factors, choice between facility rating and counterparty rating, and adoption of the definition of default. The “current condition approach” is more suitable for rating the bulk of the customers than the “through the cycle approach.”

It is prudent to undertake borrower rating in preference to facility rating because the latter may produce different rating grades for different facilities though they relate to the same borrower. There are possibilities of greater divergences in facility rating.

Developmental issues relate to identification of risk factors and fixation of number of grades in the rating scale. The rating scale should capture all possible states of loans in terms of their probability to move to a default state and represent without ambiguity the variations in default characteristics associated with each risk grade.

Implementation issues relate to rating coverage, rating approval, and rating administration process. From cost and convenience points of view, loans above specified cutoff limits may only be individually rated. Small loans below the cutoff limits can be grouped into homogeneous categories and assigned predetermined ratings on a conservative basis.

The uniformity in assignment of rating grades by different personnel at different locations can be achieved by developing norms and scores applicable to risk elements and establishing transparent criteria for assigning grades.

##### NOTES

1. CRRF is used in a broad sense. It consists of rating models, rating methodologies, rating processes, risk components, risk factors, risk elements, and scoring norms.
2. “Range of Practice in Banks’ Internal Rating Systems,” discussion paper, BCBS, January 2000. Readers may refer to this document for details.
3. New Basel Capital Accord, paragraph 452
4. New Basel Capital Accord, paragraph 453
5. New Basel Capital Accord, paragraphs 403 and 404.

## CHAPTER 10

**Credit Risk Rating Models**

## INTERNAL RATING SYSTEMS IN BANKS

In 1999, after surveying banks’ internal rating systems and processes in about 30 institutions across G-10 countries, the Model Task Force of the Basel Committee on Banking Supervision, brought out the similarities and the differences in the structure, methodology, and application of internal rating systems at the banking institutions.1 The Task Force found the following common elements in the rating systems:

1. Commonality of risk factors for compilation of ratings, though differences existed in assigning relative importance to these risk factors and in deciding the mix between quantitative and qualitative factors.
2. Prevalence of both one-dimensional and two-dimensional rating systems among banking institutions, though the majority of them assigned ratings based on the assessment of the counterparty.
3. Similarity in purposes for utilizing information from the rating that included management reporting, pricing, and limit setting.

The Model Task Force found three main categories of rating processes in banks.2 One of these processes was a “statistical-based process,” which used both quantitative and qualitative risk factors, and the default probability or other quantitative tools to determine the rating of the counterparty. In developing this type of model, the bank first identified financial variables that provided information about the probability of default, and then by using historical data, the bank estimated the influence of these variables on the incidences of default for a sample of loans. The resultant coefficients were then applied to data on current loans to arrive at a score that was indicative of the probability of default. The score was then converted into a rating grade. A small number of banks relied on this model for rating large corporate exposures and a few banks for rating middle market and small business exposures.

Another rating process was the “constrained expert judgment-based process.” Under this process, banks based their ratings on statistical default/credit scoring models or specified objective financial analysis, but modified these ratings by a limited degree by using judgmental factors. One variant of this process was to modify the rating derived from the application of a scorecard by one or two notches (both upgrading and downgrading) by using judgmental factors. Another variant was assigning the maximum number of points to quantitative and judgmental factors to keep within limits the influence of judgmental factors on ratings. The Model Task Force inferred that the constraints on judgments were more severe when such judgments were applied for rating upgrades rather than for rating downgrades. A few banks used this approach for rating large corporations and a few others for rating middle market customers and smaller corporations.

The third process was the “process based on expert judgment.” Within this process, the weight of judgmental factors in the assignment of ratings was considerable. The manner of application of judgmental factors varied between banks. A few banks considered the rating derived from statistical models as the “baseline” rating, and then modified it by using judgmental considerations. A few other banks did not rely on the use of statistical models at all. Some banks considered that the statistical tools were only one of the determinants for assignment of ratings. In all cases, the rating authority used discretion to significantly deviate from the statistical model–derived output in the assignment of a rating grade.

## NEED FOR DIFFERENT RATING MODELS

A bank should have different models for different types of counterparties, but there are other factors too that call for establishment of separate models. The number of models that a bank can have depends on the nature of its credit portfolio and the characteristics of loans and advances. In deciding the nature of models one has to keep in mind the following three factors:

1. Who is the counterparty?
2. Why does it want to borrow?
3. What amount does it want to borrow?

Accordingly, the models will vary by counterparty, loan purpose, and loan

size.

A bank has exposures to different types of counterparties who have different constitutions and who pose different kinds of risks. Where the counterparty is a bank, the risk assessment is based on the risk factors relating to capital adequacy, asset quality, liquidity profile, and profitability. If the counterparty is an industrial corporation, the focus is on risk factors like extant industrial policies, prospects of the industry, the financials of the peer group of industries, and the financial soundness of the loan proposal. Thus, risk characteristics vary between different types of counterparties. Similarly, banks sanction loans for a variety of purposes, like financing industrial and agricultural activities, trading activities, infrastructure projects, and for acquisition of assets, and so on. The risk characteristics associated with each of these activities vary according to the purposes of loans. For example, in the case of financing of industrial projects, risk factors like growth potential and economic prospects of the industry, demand-supply gap of its products, technological feasibility, and financial viability of the project are considered for risk assessment. But for financing agricultural projects, risk factors like the nature and size of the land, climatic and environmental conditions, quality of support and extension services, level of governmental support, and so on are taken into account for risk assessment. Again, risk assessment will have to be elaborate and rigorous in the case of large exposures and abridged and simple in the case of relatively smaller loans. Banks should therefore develop separate credit risk rating models to take care of variations in risk characteristics among counterparties, loan purposes, and loan sizes.

## NEED FOR NEW AND OLD BORROWER RATING MODELS

Risk rating a borrower is not a one-time affair. A borrower rated in year 1 has to be rerated after six months or a maximum of one year, that is, in year 2 and subsequently, till the accounts are closed and the relationship terminated. Periodic updating of borrower ratings reveals the risk migration that is essential for credit risk assessment. Moreover, mapping of ratings of all borrowers over the selected time zone is necessary to conduct portfolio analysis. Since the rating exercise is an ongoing process, the rating models should be different for preentry (new) and postentry (old) rating of customers, because there are some additional

risk factors that go into the postentry rating process.

The New Basel Capital Accord requires that banks intending to switch over from the Standardized Approach to the Internal Ratings Based (IRB) Approach for credit risk assessment should collect historical data on the probability of default, loss given default, and exposure at default for a period of five to seven years. Consequently, banks have to rate their old borrowers (who already exist in their books) with reference to past years in order to build up default-related data risk-grade-wise on a yearly basis.

At any time, there are many borrowers on the books of the bank who have been dealing with it for a number of years. It is customary among bankers to form a view about the current financial standing and the creditworthiness of borrowers through scrutiny of ledger accounts and assessment of compliance with the financial discipline and the terms of credit sanction. The operations in the accounts and the dealings as evident from the bank's past records serve as a mirror to judge the current financial position of a borrower, besides his or her honesty and integrity. The scrutiny of accounts and the analysis of past dealings bring out the irregularities, the deficiencies, and the problems that have surfaced in the past. This first-hand information about the existing borrowers’ dealings and observance of discipline in operating the loans and accounts in the past is vital for assessing risk. The scrutiny essentially brings out the risk elements, such as business stagnancy, overtrading, dishonesty, account manipulation, noncompliance, funds diversion, and so on, associated with the credit facilities granted to the borrower in the past. Consequently, “past dealings risk” is an important risk component that needs to be considered for rating borrowers who have been dealing with the bank for some time. For all types of borrowers, the risks arising from facility characteristics are important and should be included as a risk component in the rating model. This risk component is called facility structure risk. In the case of old and continuing borrowers, additional risk arising from past dealings risk needs to be recognized in addition to facility structure risk. It is therefore appropriate to set up two separate models for the same type of borrower even though the purpose of the loan is identical. One model is for rating new borrowers and the other for rating old (existing) borrowers in the same line of activity. The model for rating new borrowers includes the risk component facility structure risk; the model for rating old and continuing borrowers includes the risk component past dealings risk, besides facility structure risk.

There are two other variables that also influence the pattern of models, that is,

the type and the tenure of credit facilities. Banks grant loans and advances for different purposes and for different maturities. The maturities of loans spread over short, medium, and long periods, and generally match the purposes of the loans and the economic life of the assets acquired with the loans. Long-and medium-term loans are granted for infrastructure development; establishment, expansion, and diversification of industrial projects and activities; purchase of machinery; and acquisition of assets like aircraft and ships. Short-term loans are granted for meeting working capital needs and are renewed from year to year. Long-and medium-term loans granted for financing projects give rise to additional risks from project-related uncertainties and long tenure of loans. Consequently, the risk associated with project financing should be included as an additional risk component in the rating model. This risk component is called project implementation risk. This risk has to be included in the rating model for rating borrowers who obtain infrastructure development loans.

The number of credit risk rating models that a bank should have, is dependent on three main variables—the type of counterparty, the purpose of the loan, and the nature of the facility. But it does not mean that there are different sets of risk components and risk factors for each type of model. Most of the risk components and risk factors are common between models irrespective of the type of counterparty, the purpose of the loan, and the nature of the facility. The risk components that are not common between models relate to project implementation risk and overseas banking risk.

## TYPES OF RATING MODELS

Banks need to take a long-term view about the type and the number of rating models if they intend to move to the IRB Approach for credit risk assessment. Rating of each type of counterparty to which the bank has an exposure should be done through a separate rating model, which should also take into account the risks associated with the purpose of the loan. For example, the model for rating a corporate client should also take into consideration the risks arising from financing of projects, objects, commodities, or real estate, as the case may be. It is not necessary to have an entirely different model for each type of activity or each purpose of a loan. The minor variations in risk characteristics can be accommodated within the broad framework of models if there are similarities between economic activities and the risk components and the risk factors are largely common between models. But if economic activities and risk factors are

heterogeneous, as between agricultural loans, education loans, or housing loans, it is necessary to have separate models on each one of them. The bank needs to classify the credit portfolio clientele-wise and loan purpose–wise, and decide about the types of models it requires to rate the present and future borrowers.

It is necessary to establish two or three subsidiary models within the main model to take care of variation in risk characteristics owing to differences in exposure size, since risk from large exposures is much more than that from small exposures. The principle is that the larger the exposure size, the more rigorous the rating model should be. For rating relatively small exposures, the model can be simplified through deletion of several risk elements, as it will be cost effective. For instance, within the manufacturing sector, the bank can have a simplified model for rating borrowers with loan size up to U.S. $5 million, a more detailed model for rating borrowers with loan size from U.S. $5 million to

U.S. $50 million, and a much more elaborate and rigorous model for rating borrowers with loan size exceeding U.S. $50 million. Each bank may decide the cutoff limits for each type of model in accordance with the exposure-size distribution of credit.

## NEW CAPITAL ACCORD OPTIONS

The New Basel Capital Accord provides a few options to banks to determine capital requirements for credit, market, and operational risks and allows bank supervisors to select approaches that are most appropriate to their banking system. The New Accord has prescribed two alternatives for the calculation of capital requirements for credit risk. The first alternative is the Standardized Approach, which seeks to assess credit risk from the counterparty ratings assigned by external credit rating agencies. However, this approach has limitations as ratings from external credit rating agencies are usually available for sovereign governments, large multinational banks and securities firms, and large corporations, or for prime debt instruments, and not for small and medium enterprises, retail, and small businesses, which cover the largest number of borrowers in many banks. There may not be uniformity between different credit institutions across the world in fixing the values of risk weights against each rating grade assigned by different external rating agencies. Moreover, as the methodology, the risk factors, and their relative significance may vary between external rating agencies, comparison of risk grades assigned by these agencies becomes difficult. More importantly, the ratings by external rating agencies may

not be always reliable, as was evident from the inappropriate ratings assigned to mortgage-related securities that contributed to the U.S. financial crisis during 2007 to 2008 (U.S. FCIC Report).

Under the Standardized Approach, banks are required to assign 100 percent risk weight to unrated exposures for calculation of regulatory capital, irrespective of the actual levels of risks emerging from these exposures. Because of this limitation, the Standardized Approach produces at best an approximation of risk-aligned capital. It does not achieve the purpose of holding an appropriate amount of capital based on the varying levels of risks associated with unrated exposures. The true picture of the bank's credit risk profile will not come out, since unrated exposures will be large in number. Risk monitoring and risk control processes will get diluted as stronger actions cannot be directed toward high-risk exposures.

The second alternative for credit risk assessment under the New Accord is the IRB Approach that allows banks to use internally developed rating systems for credit risk measurement. It casts significant responsibilities on the banks, as they will have to make their own estimates of probability of default, loss rate given default, and exposure at default for the calculation of the total capital requirement against credit risk. The limitation of the Standardized Approach is that its main focus is on regulatory capital assessment; it does not guide the bank in effective handling of the credit risk management function. Capital adequacy assessment and credit risk management are two separate functions, though they are interlinked. The focus of the former is on credit risk identification and measurement for determination of the quantum of capital required to cover credit risk; the focus of the latter is on credit administration that includes sanction, disbursement, follow-up, supervision, and recovery of credits. If a bank adopts the Standardized Approach, it will still have to put in place an elaborate procedure for credit risk management. But the IRB Approach provides additional inputs and critical information on risk-related issues that will help banks to conduct the credit risk management function efficiently. In the long run, it is much more beneficial for banks to adopt the IRB Approach both for capital adequacy assessment and credit risk management.

## ASSET CATEGORIZATION

Banks have to establish in the beginning the internal credit risk rating framework if they want to develop their own credit risk measurement model. Banks have

devised several types of credit products with a view to aligning product designs with customer needs. Credit facilities are structured by banks so as to safeguard their own as well as the customers’ interests. Each credit exposure has certain specific characteristics that are identifiable from the type of client, the purpose, the size and tenure of the loan, and the collateral coverage and guarantee protection. It is necessary to establish a credit risk rating framework that consists of different rating models, because different types of credit assets exhibit different risk characteristics. Banks have to meet certain benchmark standards under the IRB Approach if the internally developed credit risk rating framework is to be accepted by the bank supervisors.

The IRB Approach requires banks to categorize the banking book exposures into five broad classes of assets: corporate exposure, sovereign exposure, bank exposure, retail exposure, and equity exposure.3 The Basel Committee on Banking Supervision has given options to banks to adopt their own definition of exposures, but the committee holds the view that the methodology adopted by banks for assigning exposures to different classes of assets must be appropriate and consistent over time.

## IDENTIFICATION OF MODEL INPUTS

Credit risks from borrowers arise from internal and external factors. External factors refers to the macroeconomic policies and the economic and political environment over which neither the borrower nor the bank has any control. The external factors are fiscal and budgetary policies, monetary policy, exchange rate stabilization policy, industrial policy, import-export policy, and cross-border transaction regulations. The changes in the government's fiscal policy, the central bank's monetary policy, the bank supervisor's supervision policy, and the changes in market variables have a significant impact on banks and financial institutions, which alters their risk profile. Consequently, the risk from unfavorable changes in policies that create economic and financial constraints for banks’ borrowers will have to be recognized in developing risk rating models.

The external risk factors that are included in the rating models are those that have a negative impact on the borrower's business. The risk is assessed in two stages. First, a view is formed about the possible developments that may take

place in the areas identified as external to the borrower and the bank, and second, the likely impact of those developments on the future prospects of industries, trade and commerce, and the borrower's income to service the loans is evaluated. The objective is that customers whose business is very sensitive to unfavorable changes in external factors and whose debt servicing capacity is likely to be greatly eroded on account of these changes should be rated lower in the rating scale.

Internal factors refer to those that are internal to the borrower. The internal risk factors are partly financial and partly nonfinancial. The financial risk factors are those that are derived from the borrower's financial statements, balance sheets, and business performance data. Examples of financial risk factors are the debt- equity ratio, current ratio, cost-income ratio, profitability ratio, turnover ratio, and so on. The nonfinancial risk factors are descriptive and qualitative in nature, but ultimately affect the borrower's financials. Examples of nonfinancial risk factors are prospects of an industry, competition among manufacturers, quality and marketability of products, availability of infrastructure facilities and skilled labor, and so on.

The risk factors that are included in various types of models are largely common. Where risk elements marginally vary between models due to differences in client type, exposure size, credit purpose, and credit tenure, the rating models can be modified with minor adjustments. We can think of several risk factors that can be included in the rating models, but it will be prudent, for two reasons, to keep ourselves confined to the risk factors that are material and that cover almost the entire gamut of risks. First, it is difficult and time consuming to collect information on certain finer risk elements, which may not be very material and which may have a marginal effect on the risk grade. Second, the cost involved in the collection of large amounts of information may be high and may not offer proportionate benefits.

In framing the design of credit risk rating models, banks have to identify all kinds of risks that arise from different exposure types. Three stages are involved in the risk identification process—identification of risk components that constitute the rating model, identification of risk factors that constitute a risk component, and identification of risk elements that constitute a risk factor.

### Identification of Risk Components

The broad risk components that can be included under different types of rating models are given below:

1. Industry/business prospect and stability risk.
2. Managerial risk.
3. Financial viability risk.
4. Facility structure risk.
5. Past dealings risk.
6. Overseas banking risk.
7. Project implementation risk.

Four of these risk components, component 1 to component 4, are common to most of the models, and of the remaining three risk components, component 5 to component 7, the component that is appropriate to the relevant exposure is used. There can be some variations between banking institutions in selecting the risk components for inclusion in a particular model. Such variations will, however, be marginal, as the kinds of risk that arise from a particular type of counterparty are common though the methodology for rating can vary. The risk factors that are taken into account for assessment of risks that come under each broad risk component are explained in the following section.

## ASSESSMENT OF COMPONENT RISK

For derivation of counterparty rating, banks should first assess the risk associated with each component included in the rating model. They should identify and list the risk factors and the risk elements that constitute a risk component relevant to a model and then assess each one of them to determine the level of component risk. The risk factors and risk elements pertaining to each risk components are discussed in the ensuing section; these are not however exhaustive.

### Industry/Business Prospect and Stability Risk

Banks have to assess the future prospect of the industry and the scale of business

in financing industrial/manufacturing activities. Exposures pertaining to different types of industries pose different degrees of risks. For example, the degree of risk from an exposure to a steel industry is largely dependent on the performance of other industries that use steel as input, such as ship-building, automobiles, construction, and so on. There is a positive correlation between those industries that use other industries’ products as their inputs or which supply their products to others for use as inputs. Banks need to keep in mind this correlation factor while assessing industry prospect risk in connection with the financing of industrial projects and manufacturing activities. The smaller the coefficient of correlation between related industries, the lesser will be the intensity of risk arising from stagnant or sluggish growth in other relevant industries.

Banks have to examine a few risk elements to assess the present status and the future prospect of the relevant industry, like its relative position in the economy, its susceptibility to cyclical fluctuations, and its relative profitability. The average return on capital, the average percentage of profit to sales, and the relative stability of earnings are some of the important financial parameters that depict the trend of financial performance of a particular industry. The future prospects of the industry should be assessed through examination of risk elements like the government's licensing policy, trade policy and import-export policy, the industry's growth potential and future outlook, the demand-supply gap of its products, and the extent of domestic and international competition it is likely to face. The presumption is that the more unfavorable the risk elements are, the more risky it is for the bank to finance a particular type of industry. The risk arising from inadequacy and inferior quality of infrastructure support is another important risk factor. Banks need to carefully examine the extent of infrastructure support the industry will get to carry on production on a long-term basis and achieve stability of operations.

Besides industry prospect risk, banks have to assess the business prospect risk through an evaluation of risk factors like business environment, market competition, and product pricing policy. The present level of capacity utilization in the same type of industry should be examined to ascertain the scale at which the proposed industry is likely to run since this has an important bearing on the cash flow. The scale of manufacturing and selling expenses in relation to those prevailing in similar industrial units should also be examined to assess the operating efficiency. Even the personnel policies that govern industrial relations are relevant. The presumption is that unless the industry achieves reasonable capacity utilization and operates with efficiency, the supply of its products at

competitive prices will get disrupted. The business level will be low and the business prospect risk will be high.

Another risk factor is the market competition and market acceptability of the products the industry will manufacture. Banks should examine the demand supply gap of its products, the range of products, their marketability, the marketing strategy, and the selling arrangement. An industry that is dependent on a single product, that is going to produce goods whose quality and acceptability are yet to be established in the market, and that does not have a network of sale outlets is more risky from a business point of view than an industry that manufactures a wide range of products, whose products have a brand image, and that has a chain of sale outlets. Another risk element is the proposed industry's capability to pursue a flexible pricing policy that allows price manipulation of its products in competitive markets to retain its market share and survive in a scenario of rising input costs and declining sale prices.

Banks should undertake an overall assessment of all these risk factors and risk elements to ascertain the level of industry/business prospect and stability risk for the purpose of rating. Banks usually carry out this type of risk assessment during the course of a traditional due diligence exercise to determine the extent of risk involved in financing a particular industry.

### Managerial Risk

Managerial risk is a critical risk component that influences the counterparty rating because poor management of an industry or business leads to failures even though all other requirements are met. Banks attach significant importance to the quality of management in considering a loan proposal. They assess the managerial risk through an analysis of the ownership structure, the professional competency, the past experience, and the track record of the borrowers and the status of corporate governance.

The ownership structure of the borrowing concern is an important risk factor. The risk should be assessed through examination of the form of legal entity and the holding pattern of equity (capital). The corporate form of ownership is less risky than other types of entities, since the corporation is governed and bound by several legal provisions under the Companies Act, which are more extensive and broad based than other relevant laws. A corporation has to comply with several obligations under the company laws and maintain transparencies and disclosure standards. Consequently, dealings with the corporate clients are less risky because of their professional approach to management and greater visibility of actions. Where the rules and the regulations are not comprehensive and the management actions are not transparent, the risks from the clients are greater.

The second risk factor is the past experience and the track record of the borrowers in managing the relevant industry and business, and meeting past financial commitments. The track record is judged from successful completion of projects by the borrowers in the past and the data on achievement of targeted sales and profits. In examining the track record, banks need to take a broad view and consider the borrowers’ experience in any type of industry or business. The payment of dues to the market creditors and the payment of taxes and duties to the government on time are proofs of a good track record. Lack of past experience and defaults and delays in payment of dues are symptoms of a bad track record. If there is evidence of such features, the risk is higher. The longer the managerial and technical experience of the borrowers and the better the financial record, the lower is the level of risk. If the borrowers are relatively new in the industry or trade and not much information is available about their past record, the level of risk will be relatively high. A management with tainted reputation, doubtful integrity, and dishonest market dealings is the most risky.

The third risk factor is the status of corporate governance of the prospective

clients. The critical aspects of corporate governance are appropriate organizational structure conducive to sound management, transparency in functioning, accountability of the management, and the succession policy. An appropriate organizational structure with fully committed management that is conscious of changing environmental and functional requirements, that observes objectivity and transparency in allocation of functional responsibilities, and that believes in disclosure of policies is less risky. On the other hand, management that has overlapping roles and responsibilities, that believes in inward-looking governance policies, and that is oblivious of succession policy requirements carries a higher risk. The conclusion is that the higher the managerial risk, the greater are the possibilities of business failure and the chances of default in servicing the bank's dues. The assessment of these risk factors and risk elements shows the level of managerial risk.

### Financial Viability Risk

Financial viability risk is the most important among the risk components. Financial viability is examined through an assessment of the adequacy and stability of income generated from the project/business financed by the bank during the currency of the loan. Banks examine past financial parameters and future cash flows from the industry/business to assess the borrower's loan servicing capacity. They assess financial viability risk by working out certain critical financial ratios from the borrower's balance sheet and other financial records, and comparing these ratios with the benchmarks. The important financial parameters that go into the assessment of financial viability risk are:

1. Current liabilities to current assets ratio.
2. Total outside liabilities to tangible net worth ratio.
3. Debt service coverage ratio.
4. Operating profit and net profit.
5. Return on capital employed.

Banks compute these financial parameters, both in respect to past and projected operations, from the borrowers’ balance sheets of the recent past and evaluate them to determine the level of financial viability risk.

Under the traditional credit appraisal method, both the financial ratios and the income generated from the industry/business are taken into account to judge the financial soundness of a loan proposal. The cash flow statements are prepared and the internal rate of return of the industry or project is derived and put to a sensitivity test. The internal rate of return indicates the profitability of the investment made by the borrower after repayment of the bank's dues. Besides calculation of internal rate of return, year-wise inflows and outflows of funds during the economic life of the project are calculated to judge the adequacy and the stability of income and the surplus available to service the debt. The financial parameters, which are analyzed for project appraisal under the traditional method, are also treated as risk factors for assessing the financial risk component for risk rating. For example, the analysis of debt service coverage ratio reveals information about the adequacy of income from a project to service a loan. This ratio is an input for computation of the rating. The larger the debt service coverage ratio (meaning a greater cushion in debt servicing capacity), the lesser is the financial risk. Since financial ratios are derived from the financial statements provided by the borrower, the quality of the statements or the balance

sheets is an important risk element. A critical examination of the balance sheet indicates the extent up to which financial ratios can be considered as reliable and consistent. Consequently, financial statements audited by reputed chartered accountant firms are more reliable and are considered less risky in deriving conclusions based on financial parameters.

In assessing the financial risk, it is not prudent to arrive at conclusions based on the current year's financial parameters alone. If the customer has been running an industry or business for some time, it is sensible to consider the trend of financial parameters for the past three to four years. An analysis of the trend reveals the customer's efficiency in achieving reasonable growth in sales and profits over a longer period. The financial ratios and other parameters are likely to be biased if only the current year's figures are taken into account, as these figures may contain an element of unusual swings in the volume of sales and profits due to favorable factors that are unsustainable. If the customer is new and does not have a business at present, the financial parameters of similar industries or businesses should be considered to determine whether the industry or business for which the customer has applied for a loan is likely to be financially sound. Banks take into account both the risk factors relating to the past financial performance and the stability of cash flows (present and future) to assess the financial viability risk component.

Another element of financial risk is the impact of future uncertainties on the cash flow projections. Banks should examine how the customer's financial position and the future cash flows will change if some uncertain but plausible events take place, and assess the risk from two angles. First, what will be the impact on the customer's financial position if he or she has to meet some unforeseen liabilities? Second, what will be the likely impact on the ability to raise fresh funds or further capital from the market if some negative events occur? These eventualities constitute future sources of viability risk. Banks shall assess these events carefully if the loan is repayable over the medium term or long term.

The examination of risks from all the relevant risk elements and the risk factors will show the level of financial viability risk.

### Facility Structure Risk

Facility structure risk should be assessed in a broader perspective. It is not merely the risk from the structure of credit facilities and the vulnerability of collateral, but also the risk from other factors like the age of the borrower's relationship with the bank, the number of credit institutions from which the borrower avails him-or herself of the facilities, and the foreign currency component of the facility. It is not correct to assess the facility structure risk in isolation, relying solely on the strength of collateral and disregarding other factors.

The longer the number of years the bank has been dealing with the borrower and the more information it has about his or her past dealings, the lower is the level of risk. It is therefore obvious that the risk from new borrowers is more than that from old borrowers because of the “unknown factor.” Besides, additional risk arises when banks seek to expand the relationship with large- value customers beyond a point relying solely on the honesty of their past dealings. It is wrong to assume that the bank's interest is always safe if the customers’ dealings have been satisfactory, because the financial market is highly competitive and market variables change frequently. Moreover, if large- value customers are aware of the bank's eagerness to retain and enlarge the banking relationship, they assume bargaining power to manipulate the terms of sanction that are often detrimental to the interests of the bank.

Facility structure and banking arrangement are two other elements of risk. The particular mix or package of facilities required by a borrower poses different degrees of risk to the bank. Facilities that provide financial assurance to third parties, such as financial and performance guarantees and letters of credit, carry more risk because the customers are often found wanting in honoring their commitments to the satisfaction of the third parties, which forces the latter to make claims against the bank. Facilities like overdraft against collateral of equity shares carry more risk, because a sudden fall in equity prices may substantially reduce the value of collateral. Similarly, the banking arrangement is also an element of facility structure risk. Where multiple credit institutions are involved in sharing large-value loans among themselves, banks’ risks are mitigated, but banking with multiple institutions is more risky because of the lack of coordination between them. Sometimes, the customers resort to multiple banking arrangements to avoid the financial discipline of a control-conscious bank.

Often, they take loans without the knowledge and the consent of their first banker, which raises questions about their integrity. It is sometimes found that borrowers seek trade bill financing from one bank, and term loan and overdraft facilities from another bank. The borrowers’ intention is to keep the latter bank in the dark about the volume and value of sales, which are evident from trade bills that are discounted by the former bank.

The third and the most important aspect of the facility structure risk is the collateral risk. The realizable value of collateral is uncertain, either because it is highly susceptible to price fluctuation or because it lacks marketability. The value and the quality of collateral largely decide the degree of facility structure risk. The more the value of collateral and the easier the route for sale, the lower the risk from the facility and the lower the overall financial risk. The quality and marketability of collateral are more significant than its tangibility in mitigating risk. Land, buildings, plants and machinery, residential and commercial properties are more tangible than certain other types of assets, but their risk- mitigating quality is inferior because of the time-consuming process involved in selling the securities in the event of default by the borrower. In view of the restricted marketability of these types of tangible collateral, only financial collaterals, the values of which are promptly realizable with certainty, are recognized as risk-mitigating security for getting capital relief under the New Basel Capital Accord. The financial collateral provides relief to the bank from allocating capital against the relative exposure to the extent of their realizable values. Consequently, facilities supported by easily realizable collateral carry lower risk than those covered by collateral that has restricted marketability. Unsecured or clean credit facilities carry high risk.

The fourth element of facility structure risk is the exchange risk that arises from the foreign currency component of the credit. Customers take foreign currency loans for import of machinery and raw materials, or for setting up affiliated concerns or joint ventures abroad. These loans are repayable in installments over the medium term in the foreign currency. Customers are usually reluctant to take cover against fluctuations in exchange rates on account of the additional cost involved. When the domestic currency depreciates beyond a tolerance level, the borrowers are unable to meet the additional debt burden due to the adverse exchange rate. Where the customers earn foreign exchange through export of their products or receive remittances from affiliated units or joint ventures abroad, they are in a better position to meet repayment obligations even if the domestic currency is continuously depreciating. Where the customers

do not take forward cover against the exchange risk or do not earn foreign exchange, the risk against the foreign currency component of the loan is greater. The emergence of this type of risk was evident during the Asian financial crisis of 1997 when the banks’ credit risk increased on account of the volatility in exchange rates. Banks should examine all these risk elements and risk factors and assess the level of facility structure risk.

### Past Dealings Risk

In section 10.3, I have explained the rationale for setting up separate credit risk rating models for new and old (existing) borrowers. It is erroneous to assign a risk grade to a borrower who has been dealing with the bank for a certain period of time without examining the borrower's past dealings. The focus under the past dealings risk is on the satisfactory conduct of accounts and observance of financial discipline by the borrower in the past. The scrutiny of operations in the accounts generally applies to revolving overdraft or renewable cash credit facilities, where credit limits are sanctioned for a fixed period of time, usually one year, and the borrower is free to operate the accounts on an ongoing basis within the sanctioned limits. But often irregularities occur in the accounts, either due to withdrawal of funds beyond the sanctioned limits or return of unpaid checks or unpaid trade bills. If funds are withdrawn in excess of the sanctioned limits frequently or the checks and trade bills are returned unpaid on a few occasions during a year, the borrower's credentials come under a cloud. In such situations, the bank should be cognizant of the warning signals and be cautious in dealing with him or her. Besides, the borrower is required to observe financial discipline and adhere to the terms and conditions of credit facilities. The scrutiny of operations in the ledger accounts reveals the extent and the quality of compliance with the terms and conditions of credit facilities by the borrower, which determine the level of past dealings risk. Where the assessment of the borrower's past dealings reveals breach of loan sanction terms to an unreasonable extent or frequent occurrence of irregularities, past dealings risk is high. If the irregularities are material or the past dealings are unsatisfactory, the rating of past dealings risk should be used as a rider and the risk rating assignable to the borrower should be downgraded though other risk components show a favorable position.

### Overseas Banking Risk

No fundamental difference exists in the application of criteria for rating borrowers within the country and those operating outside the country. The risk components—industry/business prospect and stability risk, managerial risk, financial viability risk, facility structure risk, and past dealings risk—which are applicable to domestic borrowers are equally applicable to borrowers at foreign branches of banks. The risk factors and the risk elements are largely the same, but the risk elements should be assessed on the basis of local conditions and the local laws of the relevant country. For example, in assessing the industry/business prospect and stability risk, the risks relating to growth potential of the industry and the government's industrial and trade policies should be assessed with reference to the situation prevailing in the country where the borrower operates. But while assessing managerial risk and financial viability risk, the judgmental factors and the quantitative parameters that are considered are broadly the same. For instance, in assessing the managerial risk pertaining to a borrower operating abroad, the same risk elements, namely, past track record, professional competence, corporate governance practices, and management succession plan, are considered.

Overseas banking risk is an additional risk component that is taken into account for rating borrowers having exposure at foreign branch offices of a bank. The risk is assessed in two stages—first in the foreign branch office and then in the corporate office of the bank. The overseas banking risk component consists of three risk elements—country risk, currency risk, and transfer risk. In some cases, there can be an additional risk if the foreign branch office extends finance to those who are not resident in that country. There can also be the risk of collateral, if the port of shipping and the port of destination of goods exported by a borrower are located outside the country where the foreign branch office is operating. In the latter case, the branch office that has provided export credit backed by documents of title to goods has no independent source to verify the merchandise or the sale-purchase particulars supplied by the borrower, nor is it in a position to take possession of the goods if the bills are not accepted by the importer or payment not made by the importer on the due date.

The country risk, currency risk, and transfer risk are not altogether different in character; they are closely interrelated. In fact, country risk emerges on account of the deteriorating economic condition of a country, which triggers currency

risk and transfer risk. Country risk refers to the risk of default by a country (and also by a resident borrower in the country) in meeting its repayment obligations to international organizations, banks and financial institutions incorporated in other countries. There is a possibility that the country may refuse payment on its liabilities on account of political changes, or be unable to honor commitments in acceptable foreign currencies due to a crisis situation. It is not possible to evaluate the economic condition of a large number of countries and assign a rating due to the lack of accessible and reliable data and information. The acceptable alternative is to take the country rating of international rating agencies and cross-check it in the light of data and information the bank has, and accordingly assign a score to the risk element “country risk.”

Currency risk is the risk of loss that can materialize on account of adverse movement of the exchange rate, which leads to increased risk of default. In assessing the currency risk it is necessary to examine the relative stability of the exchange rate and form a view about the movement of the exchange rate in future. The bank should take into account the fluctuations in exchange rates during the last couple of years, the macroeconomic variables, and the economic stability and the rating of that country, and assess the extent of currency risk.

Transfer risk is the risk of sudden restrictions imposed by the government or the exchange control authority of a country on the conversion of domestic currency into an acceptable foreign currency. The borrower may be able to honor repayment obligations in domestic currency on the due date in respect to foreign currency loans taken from a bank situated in another country, but he becomes a defaulter in the books of the bank if he is not permitted to convert the domestic currency into foreign currency and remit the money. Even if the borrower has taken the loan from a local branch office of a foreign bank and repays the installments in domestic currency, the branch office is unable to remit money to its parent office due to the restrictions imposed on the conversion of local currency into foreign currency. In forming a view on the possibility of transfer risk materializing within a specific time zone, it is necessary to look into the strength of the domestic currency of the borrower, the economic and political stability factors, and the country rating, and assign an appropriate score. The additional risk that may arise from exposures to borrowers who are not resident in the country where the branch office is functioning and the uncertainty about protection from collateral should be assessed on case-by-case basis, keeping in view the track record and the business profile of the borrower and the reputation of the manufacturer or the supplier of goods.

Banks should examine the risks from all these risk elements and risk factors and assess the level of overseas banking risk associated with customers at foreign locations.

### Project Implementation Risk

Loans for setting up infrastructure projects in the power, transportation, telecommunication, petroleum, and other sectors are long-term in nature. In assessing the risks from project finance, the risk elements that are considered for financing of industries engaged in manufacturing activities are also taken into account. But project finance has certain different types of characteristics. Consequently, some additional risks that are relevant to projects are also considered. Assessment of project risk involves examination of risk factors relating to project management and the technical and financial feasibility of the project. The financial viability of a project is highly vulnerable to delay in project completion. The cost escalation, the additional interest burden, and the delayed receipt of revenues from the sale of output due to the prolongation of the gestation period severely distort the cash flow projections. Delay in completion of projects also compels bankers to reschedule or restructure the debt in the beginning, which impairs the reputation of the promoters in the banking and market circles. Consequently, the possibility of delay in completion of a project, the probability of cost escalation, and the uncertainty in funding the cost overrun are important risk elements that need to be assessed. Further, as the implementation of a project involves immaculate planning and execution in phases, management track record in handling projects in the past is also an important risk factor. Some other types of risks may arise depending on the nature of the projects. For instance, in the case of commercial real estate projects, the project site is of high significance. The location and the ownership of the site, the constraints in getting possession of the site (if there are occupants and tenants), and the suitability of the site from a technical angle (soil texture, environmental hazards) are additional risk elements. Project risk also includes three financial risk elements—the tenure of the loan, the asset coverage, and the debt-service coverage ratio. Banks should evaluate these three risk elements to judge the financial soundness of a project.

The longer the repayment period of the loan, the higher will be the risk because of greater uncertainties. Due to the high amount of funds involved in a project, the ratio of income generated from the project to the total debt obligations of the borrower and the economic life of the project during which the income is expected to continue are crucial factors. A reasonable surplus of income provides assurance that the project has inherent strength to generate

revenues to service the loan for a 10-year or 15-year period. The lower the debt- service coverage ratio, the higher will be the risk of default. Banks should examine all these risk elements relevant to project implementation and assess the level of project implementation risk.

## SUMMARY

Banks should take a long-term view about the number of rating models they intend to have to move to the Internal Rating-Based Approach recommended in the New Basel Capital Accord for credit risk assessment. Banks should develop as many credit risk rating models as are necessary to take care of variations in risk characteristics between counterparties, loan purposes, and facility types.

Banks should set up different models for rating different types of counterparties and different activities, but it is not necessary to have entirely new models for each type of counterparty or economic activity. If risk components and risk factors are broadly similar between counterparties and economic activities, the variations in risk characteristics can be accommodated within the main models through minor modifications.

Banks should establish separate models for rating new borrowers and old (existing) borrowers, since the track record of past dealings influences the rating. Besides, for maintaining continuity of rating, a separate model for rating borrowers who continue on the books of the bank beyond a year is necessary.

The Basel Committee on Banking Supervision survey conducted in 1999 revealed that the common elements in the banks’ rating systems were the counterparty rating in preference to the facility rating, the types of risk factors used in rating, and the similarity of purposes for using ratings.

Each credit risk rating model consists of a few broad risk components, which comprise a few risk factors and the latter a few risk elements.

##### NOTES

1. “Range of Practice in Banks’ Internal Rating Systems,” discussion paper, BCBS, January 2000. Readers may refer to this document for details.
2. “Range of Practice in Banks’ Internal Rating Systems,” discussion paper, BCBS, January 2000.
3. New Basel Capital Accord, June 2006. For details, readers may refer to section III of Part 2 of the document.

## CHAPTER 11

**Credit Risk Rating Methodology**

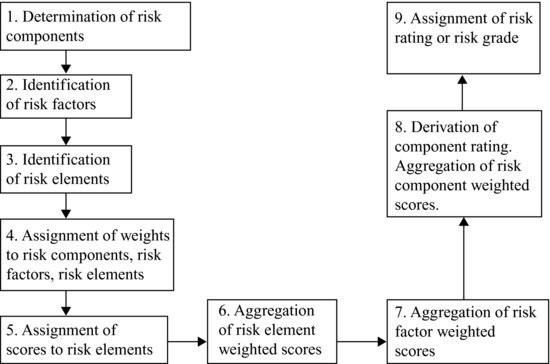
## 11.1 RATING METHODOLOGY DEVELOPMENT PROCESS

Credit risk rating (CRR) models capture the entire risk profile of the borrower and generate ratings based on the quantitative and qualitative assessment of risk factors. Banks also use discretion to modify model-generated ratings by applying judgmental factors. Several models exist for the derivation of risk ratings, but in this book I have recommended simplified methodologies for the computation of counterparty ratings. The model takes into account all credit facilities sanctioned to a borrower at different geographical locations relating to the borrower's entire operations and produces a rating that reveals the overall risk arising from the borrower's total obligations to the bank. The model recognizes facility characteristics in the derivation of the overall rating, but where appropriate, the facility structure risk can be separately rated and interpolated into the rating model to produce the final rating.

The sequential steps for credit risk rating are:

1. Determination of risk components.
2. Identification of risk factors.
3. Identification of risk elements.
4. Assignment of weights to risk components, risk factors, and risk elements.
5. Assignment of scores to risk elements.
6. Computation of risk component rating.
7. Assignment of overall risk rating or risk grade. The risk rating process is explained in Figure 11.1.

**FIGURE 11.1** Risk Rating Process



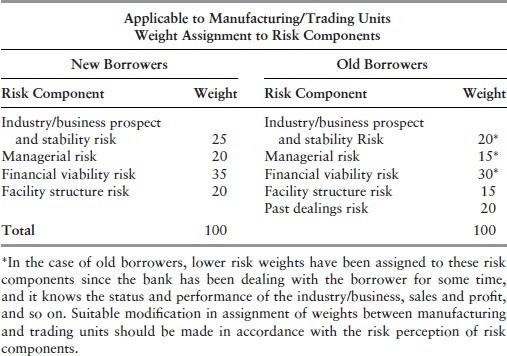
### Risk Assessment and Weight Assignment

The assessment of risk is done in four stages:

1. Risk element level.
2. Risk factor level.
3. Risk component level.
4. Counterparty level.

Each model consists of a few risk components, which in turn consist of a few risk factors and the latter a few risk elements. But each risk component, risk factor, and risk element is not equally significant and therefore, they cannot be assigned equal weights for the derivation of a risk grade. Even when a loan is appraised under the traditional method, the final decision on the loan is based on assessment of certain crucial factors. The technical feasibility and financial viability of the project have more significance for making a decision on the loan. The same principle holds good for computing the risk rating of the counterparty. For instance, among the risk components that go into the computation of risk rating under different risk models, the risk component “financial viability risk” is critical and highly significant, and is relatively more material than other risk components and therefore is assigned a higher weight. Likewise, in assessing “industry/business prospect and stability risk,” the risk factor “future prospect of the industry” is considered relatively more material than the risk factor

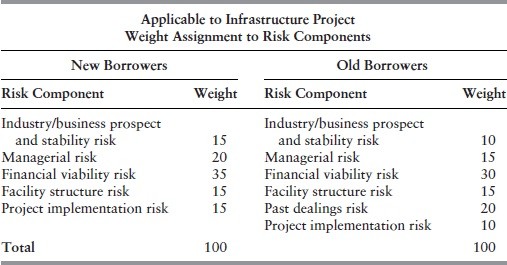
“infrastructure support,” and the risk element “growth potential and future outlook” is considered relatively more significant than the risk element “demand supply gap of its products.” For computation of ratings, the relative importance of risk components, risk factors, and risk elements has to be kept in view. While each risk component, risk factor, and risk element has its own importance, each of them carries varying significance in different types of rating models. It is necessary to determine the relative significance of the item in a model and attach a weight that matches the risk perception of that item in relation to the other items. The financial viability risk is the most significant and carries the highest weight among all the risk components. The relative importance of other risk components may vary between rating models in keeping with their significance in that model. The weights to be assigned to risk components, risk factors, and risk elements will vary between models due to differences in borrower status (new or old), loan purpose (industrial, agricultural, trading, real estate, etc.), and loan tenure (short, medium, or long tenure).

**TABLE 11.1** Credit Risk Rating Model

### Weight Assignment to Risk Components

Illustrative examples for assignment of weights to risk components under models for rating new and old (existing) borrowers are shown in Tables 11.1 and 11.2.

**TABLE 11.2** Credit Risk Rating Model



In the case of existing borrowers (those who are already enjoying credit facilities from the bank), past dealings risk is a significant factor for continuation of the sanctioned limits and relatively more important than facility structure risk and managerial risk. It has therefore been allotted a higher weight. If the operations in the accounts are unsatisfactory or stagnant, or the accounts became irregular on a few occasions in the recent past, it indicates that the borrower is facing problem in running the business, and the possibility of the account becoming nonperforming will soon become a reality. In such a situation, the borrower is assigned a rating that signifies very high risk. The bank should put this type of credit facility in the watch category and monitor it vigorously.

The bank should assign weights to different risk components in keeping with their significance in a model. In some cases, equivalent weights may be assigned to two or three risk components because of their equal significance in the model. The model shown in Table 11.2 relates to loans for setting up an industrial project, say, a power or telecommunications project. Project implementation risk is included in this model and assigned a risk weight in accordance with the significance of the item. For old borrowers, project implementation risk is lower since their track record and managerial competency are already known and hence it has been assigned a relatively lower weight.

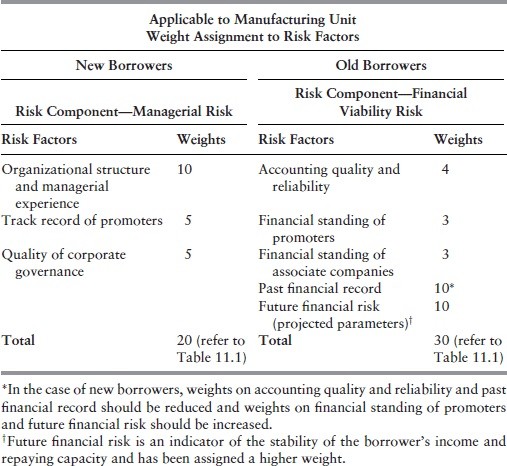
In this way, risk components applicable to different types of models (for rating corporations, banks, real estate loans, personal loans, etc.) can be identified and weights assigned in accordance with their relative significance.

### Weight Assignment to Risk Factors

The next step in the computation of ratings is to assign weights to risk factors

that constitute a risk component. The weights should be distributed in such a manner that the total of the weights assigned to risk factors is equivalent to the weight assigned to the risk component in the model (refer to Tables 11.1 and 11.2). The weights assigned to risk factors vary between models on account of varying risk characteristics and the relative significance of risk factors.

Illustrative examples for assignment of weights to risk factors are shown in Table 11.3.

**TABLE 11.3** Credit Risk Rating Model

Weights are assigned to risk factors in such a manner that the aggregate of weights is equal to the weight assigned to the relevant risk component.

In this way, risk factors under different risk components applicable to different types of models can be identified and weights assigned in accordance with their relative importance.

### Weight Assignment to Risk Elements

The next step in the computation of ratings is to identify the risk elements that

constitute risk factors and assign weights in such a manner that the total of the weights assigned to risk elements is equivalent to the weight assigned to the risk factor under a particular risk component in the model (refer to Table 11.3). The weights assigned to the risk elements vary between models on account of varying risk characteristics and the relative significance of risk factors.

Illustrative examples for assignment of weights to risk elements are shown in Tables 11.4 and 11.5.

**TABLE 11.4** Assessment of Financial Viability Risk

|  |  |
| --- | --- |
| **Weight Assignment to Risk Elements (Applicable to Old Borrowers—Manufacturing Units)** | |
| **Risk Factors/Risk Elements** | **Weights** |
| Risk Factor—Accounting standard and reliability |  |
| Risk Elements |  |
| Accounting standard and balance sheet quality | 2 |
| Auditor's comments | 2 |
| Subtotal | 4 |
| Risk Factor—Financial standing of promoters |  |
| Risk Elements |  |
| Net worth of promoters | 1 |
| Market liabilities of promoters | 1 |
| Overall indebtedness of promoters | 1 |
| Subtotal | 3 |
| Risk Factor—Financial standing of associate companies† |  |
| Risk Elements |  |
| Track record of associate companies | 1 |
| Extent of dependence on parent company | 1 |
| Future risk from associate companies | 1 |
| Subtotal | 3 |
| Risk Factor—Past financial record |  |
| Risk Elements |  |
| Current ratio\* | 1 |
| Debt-equity ratio\* | 2 |
| Inventory and receivables to net sales ratio\* | 1 |
| Operating profit before interest, taxes, and depreciation\* | 2 |
| Ratio of net profit to sales\* | 1 |
| Ratio of total outside liabilities to tangible net worth on the last | 1 |
| balance sheet date | 1 |
| Return on capital employed\* | 2 |
| Subtotal | 10 |
| Risk Factor—Future financial risk (projected parameters) |  |

|  |  |
| --- | --- |
| Risk Elements |  |
| Net worth | 1 |
| Current ratio | 1 |
| Debt-equity ratio | 2 |
| Operating profit to total income ratio | 2 |
| Return on capital employed | 1 |
| Debt service coverage ratio | 2 |
| Promoters’ capability to raise capital in future | 1 |
| Subtotal | 10 |
| **Grand Total** | 30 (refer to Table 11.3) |
| \*Average of last two to three years.  †Risk from associate or affiliated companies is included and assessed as their problems will have an impact on the parent company, that is, the primary borrower. | |

**TABLE 11.5** Assessment of Managerial Risk

|  |  |
| --- | --- |
| **Weight Assignment to Risk Elements** | |
| **(Applicable to New Borrowers—Manufacturing Units)** | |
| **Risk Factors/Risk Elements** | **Weights** |
| Risk Factor—Organizational structure and managerial experience |  |
| Risk Elements |  |
| Organizational Structure and ownership pattern of the borrowing unit | 2 |
| Past experience of promoters | 4 |
| Integrity, competence, and commitment of promoters | 2 |
| Opinion of other bankers on promoters | 2 |
| Subtotal | 10 |
| Risk Factor—Track record and competency of promoters |  |
| Risk Elements |  |
| Record of payment to creditors in the past (based on market inquiries) | 2 |
| Promoters’ competency to prepare viable business plans and achieve projected sales and profit | 3 |
| Subtotal | 5 |
| Risk Factor—Corporate governance |  |
| Risk Elements |  |
| Management dynamism and initiative | 2 |
| Awareness about corporate governance codes and strategy to implement corporate governance practices | 3 |
| Subtotal | 5 |
| **Grand Total** | 20 (refer to Table 11.3 |

In this way, risk elements applicable to different risk factors under different risk components in the models shall be identified and weights assigned in accordance with their relative importance.

### Risk Assessment and Score Assignment

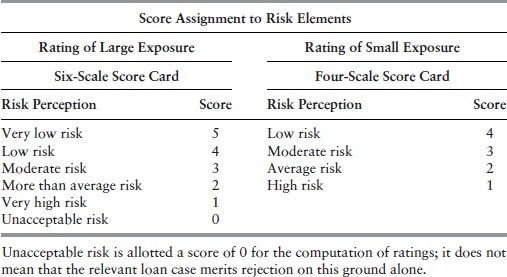
The overall risk assessment is based on subjective and objective factors, and it involves qualitative and quantitative assessments. The quantitative estimation is done from quantitative parameters derived from the financial records of the borrower (balance sheet, other published documents, and internal records). For instance, the extent of capacity utilization in an industry, growth in sales and profit, current ratio, debt-equity ratio, debt-service coverage ratio, and so on are quantitative risk elements. The quantitative risk is assessed by comparing the financial ratios derived from the financial records of the borrower to the benchmark financial ratios accepted as minimum standards. Technology risk, environmental risk, and integrity, competence, and commitment of the management are qualitative risk elements. The qualitative risk, which includes subjective risk elements, is assessed on a judgmental basis, but the judgmental view is not hypothetical. It is formed on the basis of relevant and reliable information, which is derived from quantitative indicators or which is apparently realistic. Once the judgmental view is formed, a numerical score is assigned to each risk element, whether quantitative or qualitative, based on risk perception, and the rating process is converted into a score-based arithmetical exercise to ensure accuracy in rating.

### Scale for Score Assignment

Scores are assigned to risk elements in a predetermined rating scale in accordance with the degree of risk and in keeping with the need for maintaining granularity in risk grading. The score assignment scale is shorter than the risk rating scale and can be determined by keeping in view the depth of risk analysis required for achieving accuracy in rating. The risk analysis should be comprehensive to rate a large counterparty or large exposure because of the variations in risk perception arising from marginal differences in risk characteristics or risk-related features. The bank may have a longer scale for assigning scores to risk elements, if it is rating a significant counterparty like a multinational company or large corporation, or borrowers who take loans for major activities, like the establishment of manufacturing units or the development of infrastructure projects and commercial real estate. It can have a relatively shorter scale for assigning scores to risk elements applicable to small and retail borrowers including those in the agricultural sector. In respect to a significant counterparty, a six-scale score assignment table seems appropriate,

while for small and retail borrowers, a four-scale or even three-scale score assignment table may suffice. A three-scale score assignment table can be adopted in the cases of borrowers who take personal loans like residential housing loans, car loans, or education loans. The bank has to establish appropriate scales keeping in view its credit profile and size-wise distribution of loans and advances. The bank can make a compromise by adopting a shorter score assignment scale to save time and cost, if it is clear that adoption of a longer scale will not make any material difference in the output of ratings in majority of the cases.

Illustrative rating scales for assignment of scores to risk elements are given in Table 11.6.

**TABLE 11.6** Credit Risk Rating

Score 5 in Table 11.6 indicates that the risk characteristics are so good that the particular risk element poses very low risk, and score 0 indicates an unacceptable degree of risk in a six-scale score assignment table. For instance, in assessing the managerial risk component, if score 5 is assigned to the risk element “Track record of the management,” it conveys that the borrowers have an excellent track record, and their integrity and commitment are of a very high order. On the other hand, score 0 conveys that the borrowers’ track record is bad, their integrity is in doubt, and they have a casual attitude to business.

### Norms for Score Assignment

One of the guiding principles for judging the efficiency of the risk rating framework is that the rating models should have a built-in mechanism to achieve

consistency in rating assignment within the organization. The risk rating model should generate the same output in respect of the same counterparty, even though the rating may be done by different people at different locations (corporate office, controlling office, or branch office) and both subjective and objective factors are used. The risk assessment based on quantitative and qualitative parameters may vary between different financial institutions as they may have different benchmarks. But within the same organization, variation in assignment of risk grade to the same or similar borrower can arise because of the possibility of differences in risk perception of different personnel. Within the bank the objective should be to achieve uniformity in the assignment of risk grade to the same borrower or borrowers having similar features, even though the exercise may be undertaken by different sets of people. Variations can occur in the quantitative and qualitative assessment of risk by different persons though the data and the set of information pertaining to the borrower may be the same. This type of variation in risk perception can produce different ratings in respect to the same borrower handled by different persons. The possibility of variation in awarding a risk grade to a borrower under similar circumstances by different personnel within the same bank or financial institution can be largely minimized by the development of standardized norms for assignment of scores. The norms indicate the scores to be assigned against a risk element under different sets of criteria. The application of standardized norms will not leave much scope for the use of discretion for altering or maneuvering the rating. The norms for assigning scores will have to be developed in respect to each risk element. Since each risk component usually consists of three to four risk factors and each risk factor four to five risk elements, there will be large numbers of risk elements for which scoring norms will have to be developed. The risk elements are mostly common between models, but they are different when they relate to rating models that are applicable to heterogeneous counterparties, like the borrowers in the commercial real estate sector and the manufacturing sector. The scoring norms relating to risk elements that are common between models are largely the same, but the norms may have to be modified when variations in attributes or features are noticed.

The scoring norms are described by way of attributes or features that are visible from an analysis of the risk element. The scores are allotted in accordance with the features/attributes that emerge from market inquiries and scrutiny of balance sheets, financial statements, and other reliable documents and in keeping with standard banking practices. Each norm is expressed by way

of a few possibilities that are most likely to appear or exist in relation to a point that is relevant for loan appraisal. In assigning scores to risk elements during the course of actual rating, it is not necessary that the description of features/attributes match word by word with the prevailing situation. The features/attributes describe various possibilities, and the scores should be allotted based on the concept of “similarity or nearness.” There seldom will be a situation where the description of attributes will exactly match the actual findings.

The assessment of each risk element is based on the conclusions that emerge from the analysis of features/attributes pertaining to that element. The more favorable the characteristics are from the banker's safety perception, the better is the ranking and the greater is the score allotted to it. The features/attributes are arranged downward in order of increasing risk perception and decreasing scores. The norms describe a set of characteristics, attributes, or features, which decide the relative degree of risks that may arise from the risk element under different circumstances. For example, if the characteristics or attributes of a particular risk element display very good features, it signifies “very low risk” and score 5 is assigned to that risk element in a six-scale score chart. If the characteristics or attributes indicate that the risk is of very high order, the risk element is placed in the “unacceptable risk” category and assigned score 0. Where scores are allotted on a judgmental basis, the judgmental view is based on quantitative indicators as well as information sourced from reliable documents. Banks should follow these principles in assigning scores to risk elements. Illustrative examples of scoring norms relating to different types of risk elements are described in the tables that follow. The scores are assigned in a six-scale rating chart. Part I deals with scoring norms based on a qualitative assessment, and Part II deals with those based on a quantitative assessment.

### Part I Scoring Norms Based on a Qualitative Assessment (Six-Scale Rating Chart)

Let us suppose that we want to rate a borrower who has applied to the bank for loans for setting up an industrial unit. One of the risk components in the rating model is “industry/business prospect and stability risk.” The risk component consists of two to three risk factors, and each risk factor consists of a few risk elements. We have seen that one of the risk factors under this component is “future prospect of the industry.” Let us assume that one of the risk elements

under this risk factor is “growth potential and future outlook.” An illustrative example of scoring norms based on a qualitative assessment in respect to this risk element is given in Table 11.7.

**TABLE 11.7** Risk Component: Industry/Business Prospect and Stability Risk

|  |  |  |
| --- | --- | --- |
| **Risk Factor: Future Prospect of the Industry** | | |
| **Applicable to New Borrowers** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Growth Potential and Future Outlook** | | |
| **Attributes** | **Ranking** | **Scores** |
| Growth potential and industry outlook are excellent. Large demand-supply gap exists and is likely to continue. | Very low risk | 5 |
| Growth potential is substantial and industry outlook is highly encouraging. Substantial demand-supply gap exists and is likely to continue. | Low risk | 4 |
| Growth potential is good and industry outlook is stable and positive.  Good demand-supply gap exists and is likely to continue in the medium term. | Moderate risk | 3 |
| Growth potential is low and industry outlook is not encouraging. Marginal demand supply gap exists at present. | More than average risk | 2 |
| Growth potential is poor. Supply of product proposed to be manufactured is abundant and exceeds current demand.  Future is uncertain. | Very high risk | 1 |
| No growth potential. Growth rate is negative. Excess capacity exists at present. | Unacceptable risk | 0 |

Bankers attach high importance to the management factor in making decisions on loans, as it is critical in running an industry. One of the risk factors under the “managerial risk” component is “managerial experience and competency of promoters,” and one of the risk elements is “integrity, competence, and commitment of promoters” (refer to Table 11.5).

Illustrative scoring norms for this risk element are given in Table 11.8.

**TABLE 11.8** Risk Component: Managerial Risk

|  |  |  |
| --- | --- | --- |
| **Risk Factor: Organizational Structure and Managerial Experience** | | |
| **Applicable to New Borrowers** | | |
| **Score Assignment Chart** | | |
| **Risk Element–Integrity, Competence, and Commitment of Promoters** | | |
| **Attributes** | **Ranking** | **Scores** |
| Excellent and long-standing track record. Highly competent management.  Possesses excellent technical know-how. Demonstrated ability to modernize and diversify. Fully committed. | Very low risk | 5 |
| Good track record of 3 to 5 years. Up-to-date technical knowledge.  Highly competent to run business on sound lines. | Low risk | 4 |

|  |  |  |
| --- | --- | --- |
| Shown strong commitment in the past. |  |  |
| Track record of 1 to 2 years.  No adverse feedback from market. Has adequate managerial competency. Conversant with technical know-how. Good commitment. | Moderate risk | 3 |
| Recent entry in the market. Average managerial competency. Limited technical know-how.  Limited initiatives for improvement. Average commitment. | More than average risk | 2 |
| Market standing not ascertainable. No technical knowledge.  Competency not visible from past actions. Lacks integrity and commitment. | Very high risk | 1 |
| Past defaulter.  Not competent to run business. Evidence of dishonesty.  Not trustworthy.\* | Unacceptable risk | 0 |
| \*This description is for assignment of scores for the computation of risk grade. In fact, banks usually reject credit proposals from such counterparties irrespective of the risk grade assignable to them. | | |

Table 11.4 depicts risk factors and risk elements pertaining to financial viability risk. An illustrative example of scoring norms for one of the risk elements under financial viability risk is given in Table 11.9.

**TABLE 11.9** Risk Component: Financial Viability Risk

|  |  |  |
| --- | --- | --- |
| **Risk Factor—Accounting Standard and Reliability** | | |
| **Applicable to Old Borrowers** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Auditor's Comments** | | |
| **Attributes** | **Ranking** | **Scores** |
| No adverse comments on the balance sheet by auditors.  No evidence of contingent liabilities on the balance sheet without full provision. No diversion of funds or loans to associates/affiliated concerns. | Very low risk | 5 |
| Adverse comments on the balance sheet by auditors are of minor nature. Existence of contingent liabilities on the balance sheet but 75% provisions made. Minor diversion of funds to associate concerns.  Loans to associate concerns do not exceed 15% of net worth of the borrowing (parent) unit. | Low risk | 4 |
| A few observations by auditors on the balance sheet.  Auditors’ comments have minor impact on net profit and net worth. Diversions of funds of minor amount.  Loans to associate concerns do not exceed 20% of net worth of the borrowing (parent) unit. | Moderate risk | 3 |
| A few qualifications by auditors on the balance sheet.  Auditors’ comments impact net profit and net worth to the extent of 25%. Diversion of funds of good amount.  Loans to associate concerns do not exceed 25% of net worth of the borrowing (parent) unit. | More than average risk | 2 |
| Several qualifications by auditors that alter the basic structure of the balance sheet. Adjustments result in net loss as against declared profit.  Substantial diversion of funds and loans to problematic associates or affiliated concerns. | Very high risk | 1 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Qualifications and comments by auditors regarding authenticity of balance sheets/financial statements.  Large-scale diversion of funds, irrecoverable loans to associates or affiliated concerns. | Unacceptable risk | 0 |

### Part II Scoring Norms Based on a Quantitative Assessment (Six-Scale Rating Chart)

The quantitative assessment of a risk element is based on the relative strength of quantitative/financial parameters in relation to the benchmarks set up by the bank in keeping with the safety standards of lending. The assessment is indicated by assigning a score to the risk element. The better the quantitative indicator or the financial parameter, the lower is the degree of risk associated with the particular risk element and the higher is the score.

Let us suppose that a customer has applied for a loan to set up a steel manufacturing industry. Current financials of steel manufacturing industries, which is a risk factor, are relevant for making a decision on the loan. Return on capital employed is a risk element that falls within this risk factor. An illustrative example of norms for assignment of scores (in a six-scale rating chart) to this risk element associated with “industry/business prospect and stability risk” is given in Table 11.10.

**TABLE 11.10** Risk Component: Industry/Business Prospect and Stability Risk

|  |  |  |
| --- | --- | --- |
| **(Applicable to Manufacturing Units)** | | |
| **Applicable to New Borrowers** | | |
| **Risk Factor: Current Financials of Peer Group Industry** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Return on Capital Employed** | | |
| **(current average of proposed industry)** | | |
| **Attributes** | **Ranking** | **Scores** |
| Return on capital employed (ROCE) exceeds 20% | Very low risk | 5 |
| ROCE between 16% and 19.9% | Low risk | 4 |
| ROCE between 12% and 15.9% | Moderate risk | 3 |
| ROCE between 8% and 11.9% | More than average risk | 2 |
| ROCE between 4% and 7.9% | Very high risk | 1 |
| ROCE less than 4% | Unacceptable risk | 0 |

Let us suppose we are rating an existing borrower for renewal of working capital facilities. Business prospect is a risk factor within the risk component “industry/business prospect and stability risk,” and the trend of profit growth is a risk element under the risk factor “business prospect.” An illustrative example of

norms for assignment of scores to this risk element is given in Table 11.11.

Likewise, illustrative examples of scoring norms in respect to two risk elements pertaining to the “financial viability risk” component shown in Table

11.4 are given in Tables 11.12 and 11.13.

**TABLE 11.11** Risk Component: Industry/Business Prospect and Stability Risk

|  |  |  |
| --- | --- | --- |
| **Applicable to Old Borrowers** | | |
| **Risk Factor: Business Prospect** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Trend of Profit Growth** | | |
| **Attributes** | **Ranking** | **Scores** |
| Average increase in net profit during the last 2 to 3 years over 30% | Very low risk | 5 |
| Average increase in net profit during the last 2 to 3 years more than 25% and up to 30% | Low risk | 4 |
| Average increase in net profit during the last 2 to 3 years more than 15% and up to 25% | Moderate risk | 3 |
| Average increase in net profit during the last 2 to 3 years up to 15% | More than average risk | 2 |
| Net profit marginal and stagnant during the last 2 to 3 years | Very high risk | 1 |
| Net loss during the last 2 to 3 years | Unacceptable risk | 0 |
| Scoring norms given in Tables 11.10 and 11.11 relate to the particular industry and not to an individual borrower within that industry category. | | |

**TABLE 11.12** Risk Component: Financial Viability Risk

|  |  |  |
| --- | --- | --- |
| **Applicable to Old Borrowers** | | |
| **Risk Factor: Past Financial Record** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Current Ratio (Ratio of Current Assets to Current Liabilities)** | | |
| **Attributes** | **Ranking** | **Scores** |
| Current ratio exceeds 2.0 | Very low risk | 5 |
| Current ratio between 1.50 and 2.0 | Low risk | 4 |
| Current ratio between 1.33 and 1.49 | Moderate risk | 3 |
| Current ratio between 1.25 and 1.32 | More than average risk | 2 |
| Current ratio between 1.00 and 1.24 | Very high risk | 1 |
| Current ratio less than 1.00 | Unacceptable risk | 0 |

**TABLE 11.13** Risk Component: Financial Viability Risk

|  |  |  |
| --- | --- | --- |
| **Applicable to Old Borrowers** | | |
| **Risk Factor: Past Financial Record** | | |
| **Score Assignment Chart** | | |
| **Risk Element: Ratio of Total Outside Liabilities to Tangible Net Worth** | | |
| **Attributes** | **Ranking** | **Scores** |
| Ratio less than or equal to 1.5 | Very low risk | 5 |
| Ratio greater than 1.5 and less than 2.00 | Low risk | 4 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| Ratio greater than 2 and up to 2.5 | Moderate risk | 3 |
| Ratio greater than 2.5 and up to 3 | More than average risk | 2 |
| Ratio greater than 3 and up to 4 | Very high risk | 1 |
| Ratio exceeds 4 | Unacceptable risk | 0 |

#### Scoring Norms Based on Qualitative and Quantitative Assessment for Rating Small Exposures (Four-Scale Rating Norm)

Tables 11.7 to 11.13 indicate norms for assignment of scores in a six-scale rating chart. Many banks sanction small loans to small-scale industrialists, small traders, agriculturists, and personal loans like residential housing loans and education loans. These banks have widely dispersed credit portfolios. Banks intending to set up rating models for small loans should develop scoring norms in an identical manner in a four-scale rating chart.

## DERIVATION OF COMPONENT RATING

The risk rating of the counterparty is done in two stages. First, the risk is assessed component-wise, and then the component risks are aggregated to derive the risk grade assignable to the counterparty. Each risk component is individually rated and assigned a rating, and thereafter the component ratings are converted into a single rating by mapping the weighted average score to a predetermined rating scale.

Suppose that a customer has submitted a loan proposal to a bank for setting up an industry. Further suppose that the industry/business prospect and stability risk (risk component) associated with the loan proposal is rated as moderate (BBB), the managerial risk is rated as low (A), the financial viability risk is rated as marginal (AA), and the facility structure risk is rated as low (A). The overall rating of the borrower is then computed by combining the individual component ratings. Once weights are assigned to risk components, risk factors, and risk elements, and norms are developed for assignment of scores to risk elements, it is possible to assign an appropriate rating to the component through the score assignment process. This is done by taking the total of weighted scores of a risk component and then assigning a risk grade to it in accordance with the

predetermined scale of rating. In Chapter 9.4 (Table 9.1), an illustration is given for adoption of an eight-scale risk rating grade, seven grades to cover borrowers in the standard advance category and one grade to cover borrowers in the default category. The same rating scale can be adopted for the risk component rating and overall risk rating of the counterparty. The rating scale for component rating is indicated in Table 11.14. The table excludes the eighth risk grade, which is applicable to defaulted loans. Once a loan has become nonperforming or nonaccrual, it may be given rating D.

**TABLE 11.14** Risk Component Rating

|  |  |  |
| --- | --- | --- |
| **Rating Grade Chart** | | |
| **Rating Grade** | **Description of Risk** | **Weighted Average Score (%)** |
| AAA | Very low risk | More than 85 |
| AA | Marginal risk | 80–85 |
| A | Low risk | 75–79 |
| BBB | Moderate risk | 65–74 |
| BB | Fair risk (more than average) | 55–64 |
| B | High risk | 50–54 |
| C | Very high risk | Less than 50 |

The risk components may be assigned a rating in accordance with the rating scale in Table 11.14. For instance, if the risk components “industry/business prospect and stability risk” and “financial viability risk” under any of the risk rating models get a weighted score of 63 and 76, respectively, it indicates that the former carries “fair” risk and the latter “low” risk in respect to the counterparty. Risk component rating gives an added advantage to the bank from the risk management point of view, as it indicates the specific area on which the bank should focus its attention during the period when the borrower's accounts remain live on its books to prevent deterioration in the health of the accounts and downward migration of the rating. If “industry/business prospect and stability risk” is rated “fair” and the “financial viability risk” is rated “low,” it is clear that the bank will have to monitor the borrower's business matters more closely than his or her financial affairs. An adverse development in business will have an impact on the financial viability risk as well.

Computation of component risk rating involves the following steps:

Identify risk factors and risk elements falling under a component risk. Assign scores to each risk element included in the component risk on the basis of norms.

Assign weights to each risk element as determined by the bank.

Multiply scores by weights to arrive at weighted scores against each risk element.

Take the total of risk weighted scores.

Work out the percentage of weighted scores to the maximum possible weighted score.

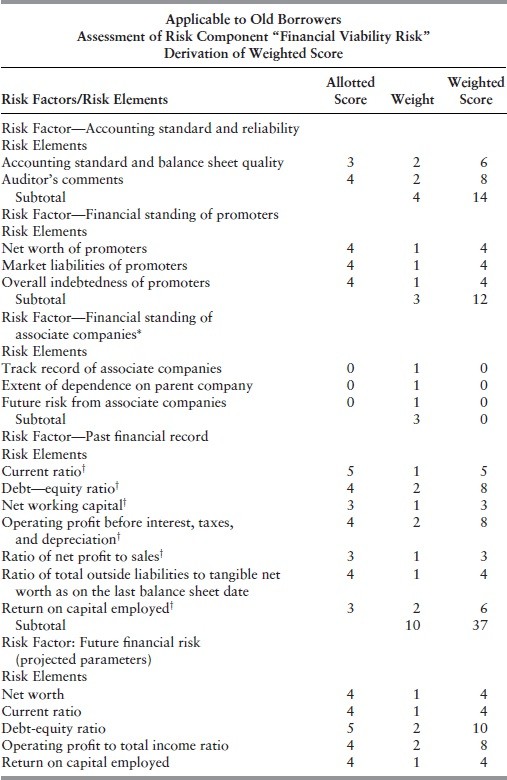
Assign a rating to the component in accordance with the predetermined rating scale (seven-grade scale shown in Table 11.14

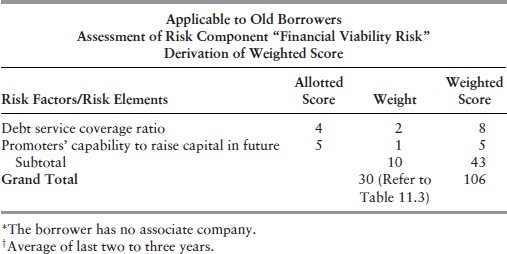
It is possible that some risk elements do not apply to a particular risk component in a rating model. In such a case, score 0 may be assigned to that risk element, and consequently the risk weighted score will be 0. While taking the total of maximum possible weighted scores in respect to a risk component, weights relating to inapplicable risk elements may be deducted from the total weight assigned to that risk component and the maximum weighted score adjusted accordingly. If the weights pertaining to an inapplicable category are reallocated to other risk elements to keep the total of component risk weight intact, it may show inconsistencies in assigning a rating to a risk component. The reallocation of weights will be done by different personnel in the bank at different locations for various types of loans, which may not show a uniform pattern. Besides, reallocation of weights may make a risk element more important though it does not merit that status. Other things remaining unchanged, the reallocation may not achieve uniformity and consistency in the assignment of a rating. To achieve consistency in the assignment of a rating, it is necessary to adhere to a standardized process and ignore the inapplicable weights, rather than adopt a discretion-based process.

Illustrations for the computation of a component risk rating, where a few risk elements are not applicable, are given in Tables 11.15, 11.16, and 11.17.

Another possibility is that all risk elements are applicable but the assessment of one or two risk elements gives a score of 0. In such a scenario it will be incorrect to deduct the total weights allotted against those risk elements and reduce the maximum weighted score. It is necessary to take the maximum weighted score for deriving the percentage of weighted score to assign a rating to the risk component.

**TABLE 11.15** Credit Risk Rating Model





**TABLE 11.16** Assignment of Risk Grade to Risk Component

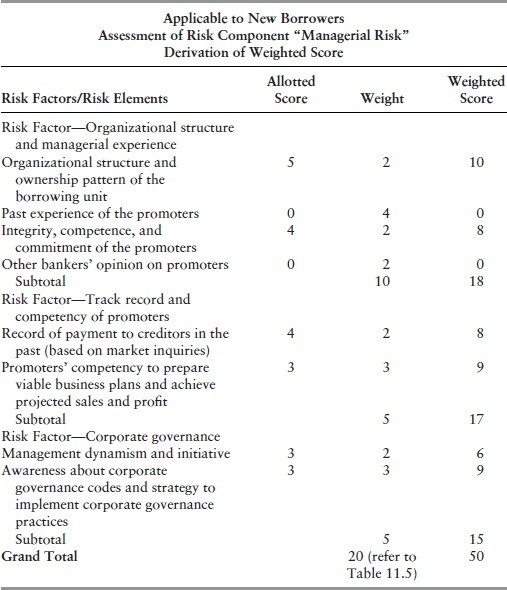
|  |  |  |
| --- | --- | --- |
| **Assessment of Risk Component “Financial Viability Risk”** | | |
| **Summary of Assessment** | | |
| **Derivation of Weighted Score** | | |
| **Risk Factors** | **Weight** | **Weighted Score** |
| Accounting standard and reliability | 4 | 14 |
| Financial standing of promoters | 3 | 12 |
| Financial standing of associate companies | 3 | 0 |
| Past financial record | 10 | 37 |
| Future financial risk | 10 | 43 |
| **Total** | **30** | **106** |

**TABLE 11.17** Assessment of Risk Component “Financial Viability Risk”

|  |  |
| --- | --- |
| **Derivation of Component Rating** | |
| Total risk weighted score | 106 |
| Maximum possible weighted score | 135\* |
| Percentage of risk weighted score to maximum possible weighted score | 78.5% |
| Rating of component “Financial Risk” | A or (Low risk) (refer to Table 11.14) |
| Maximum possible weighted score of the component = 30 × 5 = 150 (5 is maximum possible score against a risk element). Total of weights allotted to 3 inapplicable risk elements = 3.  Maximum possible weighted score for inapplicable risk elements = 3 × 5 = 15.  \*Maximum possible weighted score excluding inapplicable risk elements = 150 − 15 = 135. | |

Examples are given in Tables 11.18, 11.19, and 11.20.

**TABLE 11.18** Credit Risk Rating Model



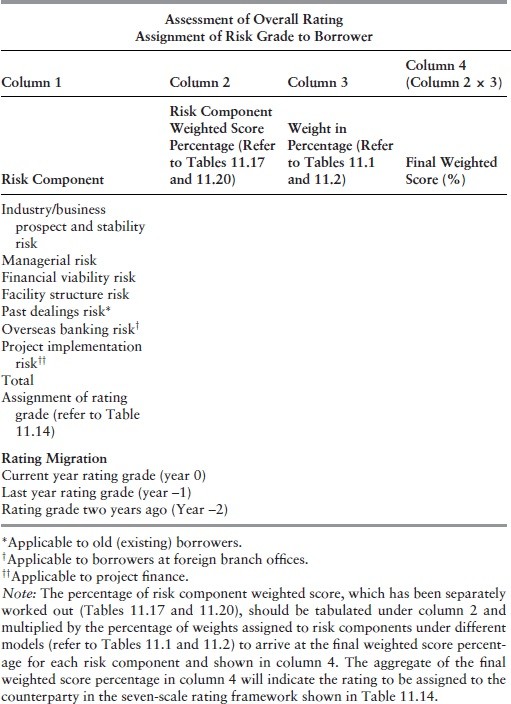
**TABLE 11.19** Assessment of Risk Component “Managerial Risk”

|  |  |  |
| --- | --- | --- |
| **Summary of Assessment** | | |
| **Derivation of Weighted Score** | | |
| **Risk Factors** | **Weight** | **Weighted Score** |
| Organizational structure and managerial experience | 10 | 18 |
| Track record and competency of promoters | 5 | 17 |
| Corporate governance | 5 | 15 |
| **Total** | 20 | 50 |

**TABLE 11.20** Assessment of Risk Component “Management Risk”

|  |  |
| --- | --- |
| **Derivation of Component Rating** | |
| Total risk weighted score | 50 |
| Maximum possible weighted score | 100 (20 × 5) |
|  |  |

|  |  |
| --- | --- |
| Percentage of risk weighted score to maximum possible weighted score | 50% |
| Rating of component “Managerial Risk” | B or (High risk) (refer to Table 11.14) |
| *Note:* The promoters did not have past experience and other bankers’ opinion on promoters is either not received or not satisfactory. These two risk elements are awarded a score of 0, but the total weighted score is retained at 100 (not reduced by 30, that is, weight 6 × maximum score 5). | |

**TABLE 11.21** Credit Risk Rating Model

In this way, the bank has to compute the rating of all risk components applicable to a model.

## DERIVATION OF COUNTERPARTY RATING

The overall risk grade assignable to a counterparty is computed through aggregation of component risk. The aggregation process involves the following steps:

1. Write down the weighted score percentage of each risk component (column 2, Table 11.21).
2. Write down the percentage of weights allotted to each risk component under the CRR model (column 3).
3. Arrive at the final weighted score percentage (column 4).
4. Take the total of the final weighted score percentage (column 4).
5. Assign the risk grade as per the grading scale (refer to Table 11.14).

The format for computation of a counterparty rating is suggested in Table 11.21.

## SUMMARY

The credit risk rating models suggested in this book involve a two-stage rating process. First, each risk component is individually rated and assigned a rating, and thereafter, the component ratings are aggregated to derive the overall rating of the counterparty. The same rating scale is used for component ratings and counterparty ratings.

Risk components, risk factors, and risk elements carry varying significance in different types of rating models. With a view to achieving accuracy in rating, their relative importance is recognized in the rating models through assignment of varying weights that match the risk perception.

Risk assessment involves qualitative assessment done on a judgmental basis and quantitative assessment done from quantitative parameters. Each risk element is assigned a score after quantitative and qualitative assessment to convert the rating exercise into a score-based process to ensure accuracy in rating. Banks may use discretion to modify ratings derived from established models in appropriate cases on the basis of judgmental factors.

Banks should develop norms for assigning scores to risk elements to minimize the possibility of variations in awarding a risk grade by different personnel to a

counterparty under similar circumstances. The standardized norms should largely achieve uniformity and consistency in ratings and eliminate scope for the use of discretion in altering or maneuvering the rating.

## CHAPTER 12

**Credit Risk Measurement Model**

## RISK RATING AND RISK MEASUREMENT MODELS

The development of credit risk measurement models has two dimensions. The first dimension is the establishment of credit risk rating models, and the second is the development of techniques for measuring potential loss on the bank's total credit exposure. Risk rating itself is a tool such that once a rating is assigned to a counterparty or a credit facility, it indicates the quantum of potential credit loss that can arise if the default occurs. If the quantum of potential loss from a rated counterparty approximately matches the actual loss in the event of default, the accuracy of the rating is validated. For example, if an obligor is assigned the AAA rating, which implies very low credit risk, it is inferred that credit loss from exposures to the counterparty will be small. Consequently, banks prescribe a lower risk weight for the calculation of regulatory capital, a lower interest rate for lending, and a lower loan loss reserve for AAA-rated credit exposures. There is an inverse relationship between the risk rating and the quantum of credit loss; that is, the higher the rating signifying lower risk from the exposure, the lower the expected quantum of potential credit loss. This relationship is likely to hold good only if the rating model is very robust and produces accurate rating grades. The rating model should include multidimensional criteria and recognize both the counterparty-specific and transaction-specific characteristics. Rating criteria should include appropriate factors that influence the level and the stability of the borrower's business and income, like economic slowdowns and macroeconomic imbalances within the country, and adverse developments in other countries that affect import and export business and cross-border transactions. The shortcomings of the rating models are that they do not often capture credit losses during economic recessions, and they assume zero correlation between risk factors and business activities. The recognition of all relevant risk parameters should, to a great extent, do away with some of the shortcomings found in credit risk rating models.

## CREDIT LOSS ESTIMATION— CONCEPTUAL ISSUES

Establishment of credit risk measurement models involves resolution of two major issues. First, when shall we say that credit loss has occurred or is likely to occur, and second, what is the time zone up to which we shall attempt to measure credit loss? The broader the definition of credit loss, the more complex the measurement process will be, and the longer the time zone for measurement, the larger the potential credit loss will be. Credit loss is defined as the difference between the current value of an exposure and its future value at the end of a chosen time period. The precise definition of current and future values emerges from the concept of credit loss that the bank adopts for setting up credit risk measurement models. On the issue of credit loss definition, two practices are in vogue among banks. One is that the loss is deemed to have occurred only when the counterparty commits a default on its repayment obligation. The other is that deterioration in the quality of credit exposure signifies credit loss, even if there is no default. Corresponding to these two definitions of credit loss, there are two paradigms for model selection—the default mode paradigm and the mark-to- market paradigm.

### Default Mode Paradigm

The default mode (DM) paradigm is a two-state model—the default state and the nondefault state—and consequently, the definition of “default” for measuring credit loss is very significant. Various concepts of default were given in section

9.3 in Chapter 9, but usually, banks define default as a credit event that conveys that the counterparty has failed to meet loan repayment obligations as per the terms of the contract, and in that event, the bank treats the relevant exposure as “nonperforming or nonaccrual” in accordance with the standard accounting practices. Under the DM paradigm, credit losses are recognized only when the counterparty commits a default in repayment obligation, but if there is no default, there is no credit loss though the credit quality may have declined. The credit loss is measured as the difference between the amount of exposure outstanding in the books of the bank and the present value of future recoveries net of all expenses and costs involved in the recovery process (e.g., legal expenses, insurance costs of collateral, recovery agent's fees, etc.). However, the DM paradigm measures credit losses from credit exposures with one year or less than one year maturity; it does not measure potential credit losses from exposures where defaults occur after the planning horizon of one year. The future value of an exposure is estimated under the DM model in terms of the loss rate given default (LGD), which is a random variable and whose value is uncertain and not known at the beginning of the planning horizon.

The DM paradigm is relatively simple and easier to operate. Under the DM paradigm, the aggregate of potential credit loss is the simple summation of potential credit losses on all the individual assets where defaults have occurred within the planning horizon. If the planning horizon is one year, all defaults taking place after one year are ignored for the estimation of potential credit losses. Some banks try to reconcile the shortcomings by capturing credit losses from financial instruments having maturities beyond the planning horizon by adjusting the rating of the instruments. The longer term instruments are assigned a lower credit rating than shorter term instruments relating to the same customer, signifying higher probability of default and higher loss rate given default. But unless other variables such as correlation factors are also recognized, the method may not produce a realistic assessment of credit loss on exposures having maturities beyond the planning horizon.

### Mark-to-Market Paradigm

The mark-to-market (MTM) paradigm is a multistate model. Unlike the DM paradigm, the MTM paradigm recognizes credit losses if there is deterioration in the credit quality, though the counterparties have not defaulted within the time horizon. The downward movements of the ratings of a counterparty or a facility to other risk grades on account of deterioration in the credit quality represent the status of the exposure in nondefault states (all states other than the default state). The MTM model requires data not only on the probability of default but also the probabilities of migration to nondefault states, known as the credit migration matrix. The credit loss under the MTM paradigm is the difference between the value of a credit exposure at the beginning of the planning horizon, that is, the current value, and at the end of the planning horizon, that is, the future value, both in default states and the states short of default. The future value of an exposure in a nondefault state is derived by marking the credit asset to the market or to the model. Since under the MTM model the decline in the economic value of an asset in nondefault states is recognized (which may be derived by marking the asset to market for ascertaining its value), the methodology for valuation of an asset in various nondefault states assumes importance. The future values of loans or facilities that have not been defaulted are calculated using the discounted cash flow methodology. The MTM model thus requires another input, the discount factors, in addition to the credit risk migration matrix. The interest rates (discount factors) used for calculation of present values of the future cash flows will be the risk-free interest rates derived from the yield curve of sovereign security papers plus the credit spreads applicable to the relevant risk grades. The value of a loan can change over time due to the migration of the borrower to other risk grades or the change in the market-determined term structure of credit spreads. The discount factors used at the beginning and the end of the planning horizon can be different due to changes in risk grades and credit spreads during the intervening period. Under the MTM model, one of the risk grades to which a counterparty or a facility can migrate is the default grade. Once the default occurs, the discounting of contractual cash flows becomes meaningless, and the future value is determined by the recovery value of the defaulted loan.

### Default Mode and Mark-to-Market Models

Both the DM and MTM models are used for measurement of credit losses. In the

case of the DM model, only the rating transition of an exposure to the default state is taken into account, and the transition to other states is ignored, but in the case of MTM model, the rating transition to all the states—upward, downward, and default states—is relevant. The gains and the losses in the economic value of assets on account of upward and downward migration of credit ratings are taken into account for estimation of potential credit losses under the MTM model. The upward movement in rating enhances the market value of the exposure and reduces the credit loss, while the downward movement reduces the market value and increases the credit loss in the event of default, because of variations in probability of default, loss rate given default, and exposure at default between risk grades. Under both the models, the loans decline in value if defaulted within the planning horizon, and the actual loss is represented by the recovery rate.

The distinguishing features of the DM and MTM models are summarized in Table 12.1.

**TABLE 12.1** Estimation of Credit Loss

|  |  |
| --- | --- |
| **DM Model versus MTM Model** | |
| **Distinguishing Features** | |
| **DM Model** | **MTM Model** |
| Two-state notion of credit loss prevails—default or no default. | Multistate notion of credit loss prevails—credit loss also arises due to deterioration in credit quality short of default. |
| Requires data on probabilities of credit rating migrations to default state within the planning horizon. | Requires data on probabilities of credit rating migrations to nondefault states as well as default state. |
| No default within selected time horizon signifies no loss on credit, even though the quality of assets may have deteriorated. | Credit loss is recognized for downward movements in rating. Credit loss is estimated by marking the asset to market at the beginning of the planning horizon and by estimating the future value at the end of the planning horizon—the difference in value represents credit loss. |
| Does not capture changes in the quality of assets over time and their impact on the financial condition of the bank. The model recognizes credit losses from defaults within the selected time horizon and their impact on the financial condition. | Recognizes both credit gains and credit losses arising from changes in asset quality over time and their net impact on the bank's financial position. |

### Choice of Planning Horizon

The bank may take into account the maturity structure of loans and advances to select the time horizon for building up an internal model for credit loss estimation. Usually, the major portion of loans and advances is for a period of one year, after which the accounts are reviewed and the limits are renewed, subject to satisfactory operation and positive outlook of the customer's business. If adverse features or irregularities are observed in the conduct of the accounts, the limits are terminated and steps initiated for recovery of dues. The quantum of loans up to one year maturity is usually significant in commercial banks, and therefore it makes sense to assume a one-year time horizon for the calculation of potential credit loss. A one-year time horizon is not unrealistic as most of the events associated with credit administration take place within a year. For example, credit reviews for remedial action, risk grade review, and capital planning for credit expansion are usually done annually. While compiling the data on probability of default, if the study is based on a relatively longer time span, say, a consecutive period of five to seven years, the probability of default of longer-term credit instruments is also likely to be captured in the majority of the cases. The selection of a one-year time zone, therefore, may not materially impair the quality of data on the default probabilities of medium and long-term loans.

## QUANTIFICATION OF RISK COMPONENTS

For estimation of credit loss, banks need to have the data (average values) on the following inputs:

Probability of default. Loss rate given default. Exposure at default.

Maturity or tenor of credit instruments.

Correlation between counterparties and risk factors.

### Estimation of Probability of Default

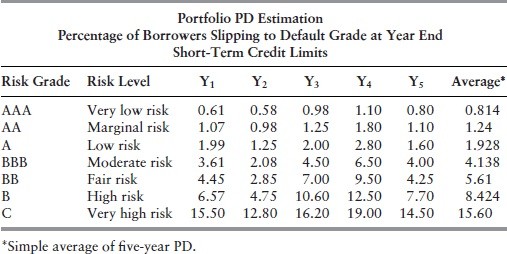
Probability of default (PD) refers to the possibility of a counterparty committing a default on repayment obligations to the bank during the selected time horizon. This definition is valid both for DM and MTM models. The New Basel Capital Accord has stipulated that “banks may use one or more of the three specific techniques—internal default experience, mapping to external data, and statistical default models” for estimation of the average PD for each rating grade in respect to corporate, sovereign, and bank exposures.1

A bank should have an internal credit risk rating system to estimate the average PD based on internal default data. The bank may use the borrowers’ ratings derived from the internal rating system to compile the data on PD and estimate PD borrower-wise rather than facility-wise, if the borrower enjoys more than one facility. All credit facilities enjoyed by a borrower should be considered at the same time to determine whether the borrower is in default. If a borrower commits default on any of the credit facilities, all the other facilities enjoyed by him or her may be deemed to have been defaulted concurrently. The New Basel Capital Accord requires banks to estimate PD separately for corporate, sovereign, bank, and retail exposures. The bank can choose the DM paradigm and one-year time horizon to compile time series data on PD based on the internal default experiences of borrowers in each risk grade. It can utilize the internal credit ratings assigned to counterparties over a period of time to compile a credit risk migration matrix, including migration to the default state for application in the MTM model. The bank should generate data on PD for a continuous period of at least five to seven years. For estimation of PD on retail exposures, the bank may assign the exposures to asset pools based on the homogeneity of borrower characteristics or facility characteristics and build up the data on a random sampling basis. For example, loans to small-scale industries, loans to farmers or co-operative societies for agricultural purposes, residential housing loans, personal loans, credit card debits, and so on can be separately grouped under different (homogeneous) pools, and average PD can be derived for each asset pool.

The bank should compile data on PD separately for each asset class to make an estimate of the potential loss on total credit exposure across the organization. PD should be derived for counterparties in each risk grade (AAA, AA, …BB, C, etc.) and for each asset class (corporate, sovereign, retail, etc.) for a period of

five to seven years, and the data suitably organized to generate risk-grade wise distribution. If the bank intends to follow the portfolio approach to estimate credit loss, it should compile PD on a portfolio basis and for each portfolio, like manufacturing sector, trade sector, commercial real estate sector, capital market sector, retail sector. It should identify the portfolio to which the counterparty belongs, place the default data pertaining to different grades in the respective portfolio, and compile risk-grade-wise and portfolio-wise average PD.

The estimation of risk grade-wise PD based on internal default experiences is shown for a given portfolio in Table 12.2 and for all portfolios taken together in Table 12.3.

**TABLE 12.2** Manufacturing Sector Portfolio

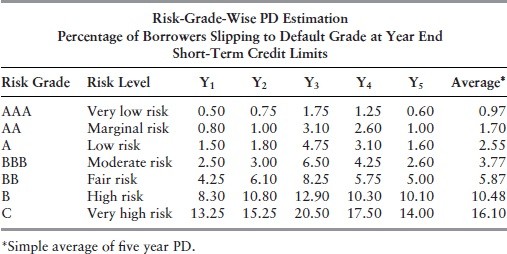
The estimation in Table 12.2 is for the manufacturing sector portfolio only. Likewise, PD has to be estimated for each portfolio or subportfolio. In this case, PD has been estimated under the DM paradigm using a one-year time horizon. The number of borrowers changes every year, as some existing borrowers quit or close their accounts and some new borrowers establish credit relationships. If a borrower has defaulted in any of the credit facilities as on the last date of the accounting year (bank's balance-sheet year, say December 31 or March 31), it has been treated as a case of default.

Year 1—Average year.

Year 2—Economy was doing good. Year 3—Economy was sliding down. Year 4—Economy was under stress. Year 5—Economy was improving.

Thus, a longer-term average PD is likely to take care of the concerns of

economic downturn and obligor correlation.

**TABLE 12.3** Bank-wide—All Portfolios (All Borrowers)

Year 1—Normal year.

Year 2—Economy was sliding down. Year 3—Economic slowdown set in.

Year 4—Economy was recovering from slowdown. Year 5—Economy was returning to normal year.

The second technique for PD estimation suggested in the New Basel Capital Accord is based on the mapping of internal data to external data. The bank's own internal credit risk grades should be mapped to the grading scales of the external credit rating institutions, and then the default rate observed with respect to the external rating institution's risk grades should be attributed to the bank's rating grades. If banks intend to apply this technique, they will face at least two constraints. First, the criteria used for ratings by a bank and an external credit rating institution should be comparable, but the latter's criteria are usually not transparent and may not be known to the bank. Second, the external credit rating institutions may not have ratings and default rates for all types of clients of a bank, ranging from large corporate to small borrowers. Consequently, the application of this technique may not give a complete picture of PD for many banks. However, banks can cross-check their ratings and default probability rates with the relevant data of external credit rating institutions at least for large exposures, provided their ratings are known to be reliable.

The third technique relates to the application of statistical models to derive data on default probabilities. The New Basel Capital Accord permits banks to use statistical models for PD estimation subject to meeting the following specific

requirements:2

The variables that are used as inputs in the model must form a reasonable set of predictors.

The bank must have in place a mechanism to assess the accuracy, completeness, and appropriateness of the data used as inputs in the statistical default or loss prediction models.

The data used in the model must be representative of the population of the bank's actual borrowers or facilities.

The bank must have a procedure that allows human judgment and human oversight to modify model results where appropriate.

The bank must have a regular cycle of model validation.

The characteristics of PD are described here in brief:

PD is the probability of a borrower defaulting on repayment obligations within a given time horizon (usually 12 months).

PD is the output of credit risk rating models.

PD estimation is based on the rating migration of the borrower to the default grade over a period of time.

PD estimate is required for both DM-type and MTM-type models. PD shall relate to each asset class and each rating grade.

### Estimation of Loss Rate Given Default

Loss rate given default **(**LGD) is the percentage of loss that the bank is likely to suffer on its total exposure to a counterparty in the event of default. The percentage of net recovery to the outstanding dues as on the date of default is the recovery rate, and for a set of counterparties the average rate of recovery can be derived from the recoveries made in the defaulted accounts over a period of time. LGD is 100 percent minus the recovery rate percent, meaning that the higher the recovery rate, the lower the LGD.

Certain constraints arise in making accurate estimation of LGD. Correlations between credit events and borrowers are important inputs for modeling the probability distribution of LGD. But reliable data on correlation between borrowers due to credit events are seldom available. The Basel Committee on Banking Supervision document, *Credit Risk Modelling—Current Practices and Applications* (Basel, April 1999, Part III), has revealed that “most models assume zero correlations between credit events of different types, although such

correlations may in fact be significant.” The document also points out that “models (used by some banks) generally assume zero correlation among LGD of different borrowers.”

The lack of data on correlation between credit events and borrowers is a real handicap in establishing credit loss estimation models. In general, LGD is dependent on client type, product type, collateral backup, seniority class, recovery laws, collateral enforcement procedures, and the time for realization of collateral values. In certain typical situations, the borrower's attitude significantly influences the values of LGD. Collateral is an important factor that influences the recovery rates, and that may be one of the reasons why emphasis is given on the estimation of LGD facility-wise in the New Basel Capital Accord.

The New Accord allows banks to make their own estimates of LGD for each facility. LGD estimates should take into account not only the average economic loss during normal times but also the severity of losses during periods of high credit losses, like losses during cyclical downturns or periods of economic distress. The New Accord has laid down certain conditions for acceptability of the internal estimates of LGD made by banks themselves. As the Accord puts it, “LGD cannot be less than the long-run default-weighted average loss rate given default calculated based on the average economic loss of all observed defaults within the data source for that type of facility. … LGD estimates must be grounded in historical recovery rates and, when applicable, must not solely be based on the collateral's estimated market value. … Estimate of LGD must be based on a minimum data observation period that should ideally cover at least one complete economic cycle but must in any case be no shorter than a period of seven years for at least one source.”3 The computation of LGD should also take into account the possibility of unexpected losses on defaulted exposures.

A few issues are involved in deciding the methodology for estimation of LGD of loans and advances. The first issue is whether the historical data on LGD of bonds and debentures, which are usually available, can be taken as proxy. The bank cannot possibly do that because the historical data on LGD of bonds may not be representative data for modeling purpose. The characteristics of loans and advances are different from those applicable to bonds, because the loans are usually secured by cash margin, tangible collateral, and third-party guarantees. The major portion of loans and advances is usually in the form of short-tem credits, which have a one-year tenure and which are usually renewed every year unless irregularities occur. But bonds have a fixed and longer tenure, and they

are not usually protected by tangible collateral. Banks have more control over borrowers who have taken loans, as they are subjected to a definite follow-up procedure, than companies that have issued bonds. The supervision over bond- issuing corporations is unstructured, less transparent, and least documented. In fact, banks have virtually no control over companies whose bonds they have purchased. Further, banks have direct access to collateral against loans and advances, and they are in a position to realize collateral values soon after default. In the case of bonds and debentures where the redemption value is in default or the corporation is bankrupt or insolvent, an elaborate liquidation procedure is involved, and the realized money is distributed by seniority class, in which case the banks may not have priority. These distinguishing features between loans and bonds lead us to infer that in a postdefault scenario, on average the loss is likely to be less severe in the case of loans and advances than in the case of bonds. It is therefore not correct to assume that the historical LGD of corporate bonds may serve as a proxy for the estimation of LGD of loans and advances.

The second issue is: Shall we estimate LGD on a borrower basis or facility basis? Large corporations or multinational companies enjoy a package of credit facilities, often from more than one bank or financial institution, and they also raise money through the issue of bonds in tranches that run concurrently. In view of this multiproduct approach of companies in meeting their financial needs, it is incorrect to estimate LGD on an individual credit facility basis. If a borrower commits default in any of the credit facilities with any bank, it gives a signal that the borrower's financial position has deteriorated, and the borrower is likely to commit default in all its accounts soon with all the banks. Bank regulators usually issue directions for classification of loans and advances as nonperforming on a borrower basis rather than on a facility basis, and accounting principles also support the same practice. If a borrower defaults on any of the credit facilities with one bank or financial institution, it should be treated as a defaulter throughout the financial system irrespective of the health of its accounts with other banks and financial institutions in order to prevent the borrower from misusing the financial system by retaining the status of a nondefaulter. It is thus more appropriate to estimate LGD on a borrower basis rather than on a facility basis, because banks have a general lien on collateral, and they can set off the excess value of collateral, after settlement of dues in the loan account with which the collateral is attached, against the dues in other accounts of the same borrower though they may not be able to recover their dues in full. Since banks have the right of general lien, it makes more sense to take the

total dues of the borrower in default and the total recoveries made by all means (through sale of collateral, invocation of guarantee, and recourse to legal suit) and arrive at the total of unpaid dues, which represent the credit loss. However, facility-wise LGD is meaningful in cases where a single type of facility is involved, like residential housing loans, car loans, and personal loans. It is thus useful and realistic to follow a two-dimensional approach for the estimation of LGD: facility-wise LGD where a singular type of facility is involved and borrower-wise LGD where multiple credit facilities are involved. Banks can thus customize the approach for estimation of LGD in tune with the structure and the composition of the credit portfolio.

The third issue is: When shall we draw the line between the amounts recovered in the defaulted accounts and the amount that cannot be recovered any more? LGD estimation is based on the presumption that on the date of consideration the recoveries have been completed and the amount of unrecovered portion in the defaulted accounts is the credit loss. But most often, the recoveries are slow and come in irregular installments, and they are also uncertain due to weak recovery laws, lengthy court procedures, or willful default. Often commercial banks, more particularly government-owned banks, make full provisions against the total loan loss in borrowers’ accounts, but they put off the loan write-off decisions in expectation of further recoveries or for continuation of recovery actions for fear of regulatory censure, till it is established beyond doubt that no further recoveries are possible. Even when banks want to compile the loss distribution data from the historical records, the process is hampered due to the lack of clear regulatory guidelines on the timing of the loan write-off. One way to get out of this dilemma is to formulate a clear policy specifying the circumstances and the time frame for deciding the deadline on recovery. A transparent loan write-off policy is beneficial for all—the public, the shareholders, and the bank regulator/supervisor.

The compilation of LGD data based on historical loss experiences is practicable and dependable. The loss data should be compiled, borrower-wise, risk-grade-wise, and portfolio-wise, from actual recoveries made in the defaulted accounts for a period of at least seven years. In the case of small and retail loans, which are pooled together to form an asset class, average LGD should be compiled on a random sampling basis for each class of retail asset like transport loans, housing loans, credit card dues, and so on. The longer the period of observation for compilation of LGD data, the more representative will be the data for modeling. The longer span of time will do away with the common

concerns associated with model development, that is, the exclusion of correlation factors between borrowers/industries and nonrecognition of the severity of losses during cyclical downturns or economic distress. The correlation between borrowers within the same portfolio or between different portfolios and the losses during the periods of economic slowdown will get reflected in the LGD data, if the time period of observation is sufficiently long. The unexpected losses will also be captured as the data will be compiled from actual recoveries made in the defaulted accounts. The simple average of LGD should be derived from the seven-year LGD data, which will serve as the representative LGD for estimation of potential credit loss on the total credit exposure of the bank.

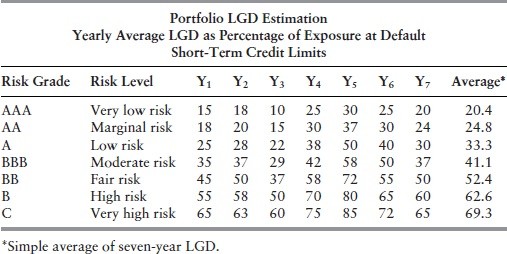
It is possible to work out portfolio-wise and risk-grade-wise estimates of LGD from borrower-wise LGD data. The illustration of risk-grade-wise LGD for a given portfolio is shown in Table 12.4.

Year 1 and 2—Normal years.

Year 3—Economy was performing well. Year 4—Economy was slowing down.

Year 5—Economic depression set in.

Year 6—Economy was recovering from slowdown. Year 7—Economy was returning to normal.

**TABLE 12.4** Manufacturing Sector Portfolio

Note that when the economy was performing well, the defaulted amounts in individual borrowers’ accounts were relatively low and the recoveries were better due to greater options for disposal of collateral, and the LGDs were low. The situation was reversed during economic slowdowns. LGDs are relatively low in risk grades AAA, AA, and A on account of stronger collateral protection

against the credit facilities.

The year-wise LGD shown in Table 12.4 has been computed by deducting the actual recoveries from the outstanding dues in each defaulted borrower's accounts, and the data relate to a period of seven years, including periods of economic slowdown. The average LGD is the simple average of year-wise average LGD of defaulted borrowers in each risk grade.

The correlation between borrowers within the manufacturing sector and those in other related sectors is likely to get reflected and the severity of losses during periods of economic distress captured, as the data relate to a time period of seven years. In a similar way, LGD for other portfolios, such as trade sector, capital market sector, real estate sector, residential housing sector, or retail sector, can be compiled. Banks can compile asset-class-wise and risk-grade-wise distribution of LGD by estimating obligor-wise LGD and then placing the obligors in the respective asset class and the risk grades. For calculation of LGD in respect to retail asset pools, a sampling method may be followed, if necessary.

In brief, the characteristics of LGD are the following:

LGD is the percentage of outstanding dues lost after the default occurs. LGD is collateral driven but can vary between exposure types due to varying recovery expectations. High value and easily realizable collateral triggers lower LGD.

The risk measurement model requires historical LGD data—time series data on recovery performance—data for one complete economic cycle but not less than seven years.

LGD data sources are (1) the bank's own historical data, (2) other banks’ data, (3) trade association data, (4) published regulatory reports, and (5) rating agency reports.

### Estimation of Exposure at Default

Exposure at default (EAD) quantifies the expected level of the bank's gross exposure to a counterparty in the event of default or at the time the default occurs. The New Basel Capital Accord has specified the procedure for estimation of EAD in paragraphs 82 to 89, 308 to 317, and 474 to 479. Banks can follow this procedure, or else they can adopt somewhat simplified procedures and make their own estimates of EAD taking cues from the guidelines prescribed in the Accord as suggested in the ensuing paragraphs.

The banks’ exposures to counterparties that involve credit risk can be categorized into four segments—direct credit segment, credit substitute segment, off-balance sheet segment, and derivatives segment. Besides, banks will have exposures by way of investments in other types of financial instruments that involve counterparty credit risk. The direct credit segment consists of short-, medium-, and long-term credit lines. Short-term credit lines take the form of renewable credit and overdraft limits where the balances in the accounts keep on fluctuating and which are usually valid for a period of up to one year. The customer has the option to withdraw funds up to the limit at any time. Usually, the customer tends to draw more funds available under the sanctioned limits when he or she is under financial pressure and when he or she senses that the rating assigned to him or her is likely to be downgraded. Consequently, it is reasonable to assume that EAD will be 100 percent of short-term renewable credit and overdraft limits at the time of default. Banks can accordingly estimate EAD in respect to short-term credits as the aggregate of debit balances outstanding or the sanctioned limits, whichever is greater, as on the reference date. The other option is to make an estimate of EAD on the basis of the average percentage of limits drawn in defaulted borrowers’ running accounts up to the date of default, plus a percentage of undrawn limits that were in force. Banks can derive the average percentage of utilization of limits in the defaulted borrowers’ accounts from the historical data for a period of seven years or more. Regarding the percentage of unutilized portion of the limits that can be added to the utilized portion to estimate EAD, banks may use data based on empirical observation, past experience, and judgment. For estimation of potential losses on exposures, banks should build up asset-class-wise, portfolio-wise, and risk-grade-wise EAD of short-term credit facilities.

Another form of direct credit line is medium-and long-term loans with tenures

ranging from more than one year to 15 years or above. The term loans are generally drawn up to the full value and amortized over their tenure. A few of them may be recently sanctioned and partly disbursed or yet to be disbursed. The purposes for which term loans are sanctioned to customers are different, and the maturity periods and the sources of repayment are also different. The point at which the customers are likely to commit default during the long tenure of the loan is difficult to predict. At any time, most of the term loans have been partly repaid, and the exposure will be lower than the amount originally sanctioned and disbursed. Accordingly, banks can estimate EAD in respect to medium-and long- term loans as the aggregate of debit balances outstanding in the accounts where loans have been fully disbursed and the sanctioned limits where loans have been partly disbursed or undisbursed. Banks should compile asset-class-wise, portfolio-wise, and risk-grade-wise data on EAD in respect to medium-and long- term loans.

The second segment relates to exposures by way of subscription by banks to the bonds and debentures issued by companies, which are regarded as credit substitutes. These financial instruments are issued for various maturities, and the principal together with the unpaid interest is payable on the maturity date. It is reasonable to assume that the maturity values of the bonds and debentures will be the EAD. In respect to investments in other types of financial instruments and placements (Treasury bills, securities, equities, commercial papers, money market placements, etc.) that involve counterparty credit risk, EAD can be taken as the higher of the face value or the book value. Banks should make a separate estimate of EAD with respect to the investment portfolio that involves counterparty credit risk.

In respect to the third segment relating to off-balance-sheet credit facilities/commitments, banks should also separately estimate the EAD. The New Basel Capital Accord allows banks to calculate EAD on off-balance-sheet items as the committed but undrawn exposure amount multiplied by credit conversion factors that can be estimated either under the foundation approach or the advanced approach. Under the foundation approach, the types of instruments and the credit conversion factors applied to them will be the same as applicable under the standardized approach, except in respect to commitments, financial guarantees, sale, and repurchase agreements with recourse, for which a credit conversion factor at 75 percent will be applicable irrespective of the maturity, excluding facilities that are unconditionally cancellable (see paragraphs 311 and 312 of the New Accord). Banks can either follow the foundation approach or

make internal estimates of credit conversion factors under the advanced approach, except those where 100 percent credit conversion factors are applicable under the foundation approach, for each facility type like letters of credit, commitments, financial guarantees, sale, and repurchase agreements with recourse, subject to meeting certain minimum requirements specified under the New Accord (see paragraphs 474 to 479). For this purpose banks must establish adequate systems and procedures to calculate EAD in respect to off-balance- sheet items that are acceptable to the bank supervisor and the external auditors.

The fourth segment relates to counterparty risk arising out of derivative exposures. The longer the tenor of the contract for derivative instruments, the greater will be the credit risk. For estimation of EAD on derivative transactions, banks may ignore the derivative contracts that are outstanding with a central counterparty (e.g., a clearing house), excluding those that have been rejected by the latter. The bank can make an estimate of EAD for OTC derivative contracts on the basis of the current exposure method recommended in paragraph 92(i) of Annex 4 of the New Accord. “Under the Current Exposure Method, banks must calculate the current replacement cost by marking contracts to market, thus capturing the current exposure without any need for estimation, and then adding a factor (the “add-on”) to reflect the potential future exposure over the remaining life of the contract.” … “In order to calculate the credit equivalent amount of these instruments under this current exposure method, a bank would sum:

The total replacement cost (obtained by “marking to market”) of all its contracts with positive value; and

An amount for potential future credit exposure calculated on the basis of the total notional principal amount of its book, split by residual maturities” as specified in paragraph 92(i) of the New Accord.

Banks should make a separate estimate of EAD in respect to the derivatives portfolio. To summarize:

Banks should build up data on EAD in respect to (1) short-, medium-, and long-term credit facilities, (2) investment segments that involve counterparty credit risk, (3) off-balance-sheet portfolios, and (4) OTC derivatives portfolios.

The characteristics of EAD are the following:

EAD is the expected level of gross exposure at the time of default. EAD varies according to the structure of credit facility, facility characteristics, and covenants governing operation on the facilities.

EAD tends to increase with the deterioration in the credit quality.

## CREDIT RISK MEASUREMENT MODELS

Credit risk measurement models usually target credit segments and credit products. Though the modeling practices differ between banks, the ultimate objective is to estimate the quantum of potential losses from credit exposures that are realistic and close to the actual losses when defaults occur. Models generate potential credit losses that determine the quantum of economic capital needed to support all credit risk–related activities of the bank. They enable the bank to set up a risk-based loan pricing system and compute the risk-adjusted return on capital (RAROC), which is the basis for evaluation of managerial efficiency and relative performance of business lines. The model output guides the bank in fixing exposure limits, optimizing portfolio concentration, and allocating economic capital for credit risk. The efficacy of measurement models is judged by their ability to capture the uncertainty of future credit losses around an expected figure.

The primary constraints in developing internal credit risk measurement models are the availability of data on default probabilities, recovery rates in the event of default, and the correlation between risk factors. The absence of a secondary market for loans and the lack of supportive data for back-testing and model validation are the other limitation factors. Credit-related instruments are scarcely traded in the market and therefore their present values are not known, and the extent of erosion in their values cannot be precisely determined. The unavailability of a comprehensive record of historical prices of credit instruments over a longer time horizon is another constraint in developing credit risk measurement models.

Definition of credit losses, choice of planning horizon over which the credit losses are to be measured, determinants of loan values, and treatment of credit- related optionality are critical inputs in the development of credit risk measurement models. The easy, but reliable, way to measure credit loss is to assume a one-year planning horizon and the DM paradigm. Potential credit losses are likely to be greater under the DM model most of the time than under the MTM model, because in the latter case the increases in the quantum of losses on exposures that deteriorate in quality and are downgraded are partly offset by the decreases in potential losses on exposures that improve in quality and are upgraded during the planning horizon. In the DM model the current value and

the future value of a nondefaulting loan equal its book value, while in the MTM model the current value of a nondefaulting loan is the present discounted value of the contractual cash flows, and the future value is the present discounted value of its remaining contractual cash flows. The loss in the value of a defaulted loan, both under the DM and MTM models, is estimated on the basis of loss given default rates.

### Internal Model—Estimation of Expected Loss (EL)

Banks can establish their own models for the estimation of potential credit loss on the total exposure in accordance with the methodology suggested in the New Basel Capital Accord. The latter deals extensively with the procedures for estimation of losses for different asset classes, both under the Standardized and Internal Rating-Based Approaches in paragraphs 375 to 379 and 471. Taking cues from these guidelines, commercial banks can follow a simplified process to calculate expected and unexpected losses. The expected loss is the aggregate of potential losses on all types of exposures that involve credit risk or counterparty risk and is calculated as the product of PD, LGD, and EAD and expressed in percentage terms. Banks should compile the average values of PD, LGD, and EAD for each portfolio and each risk grade for all nondefaulted exposures and calculate the expected loss for each portfolio on nondefaulted exposures, and sum up the losses to arrive at the aggregate potential loss. They should separately make a conservative estimate of expected loss on defaulted exposures based on the recovery prospects and provide some cushion to take care of unexpected losses. If the risk factors relating to economic slowdown, industry correlation, and maturity of the instruments are included in the credit risk rating models, and if the average values of PD, LGD, and EAD are compiled from the bank's internal loss experiences based on an observation period of seven years or more, it is expected that the values will be representative. Besides, if models are back-tested and regularly validated by comparing the model-generated estimated losses with actual losses, the reliability of the models gets established. The simplified formula for calculating expected loss (EL) is:

The characteristics of EL are described here:

EL shows the amount of credit loss a bank will expect on all credit risk- related exposures over the chosen time horizon.

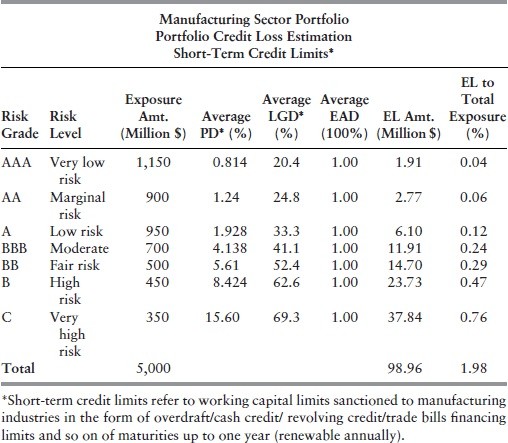
EL is average loss expectation and varies from year to year. EL is the first level of loss estimation and additive.

EL can be calculated for every borrower or every facility in the portfolio and then aggregated to derive the portfolio EL.

EL shall be separately estimated for nondefaulted and defaulted exposures.

EL serves as input for determining economic capital, risk-based loan pricing, and provisions against loan losses.

The calculation of expected loss on nondefaulted exposures for a given portfolio is shown in Table 12.5. It is a simplified illustrative example.

**TABLE 12.5** DM-Type Model

In Table 12.5, PD and LGD relate to the portfolios that have been compiled from data pertaining to individual borrowers in the portfolio. For conservative estimates, EAD has been assumed to be 100 percent irrespective of the risk grade. Assuming that the bank has short-term credit exposure aggregating U.S.

$5.00 billion in the manufacturing sector, the EL under the DM model is estimated at U.S. $98.96 million or 1.98 percent of the total short-term credit exposure in that sector. Average PD and average LGD for the portfolio have

been calculated on the basis of actual default and actual recovery on short-term credit limits that exist in the books of the bank (refer to Tables 12.2 and 12.4). The estimation of PD based on five-year actual default cases and LGD on seven- year actual loss data takes care of the concerns regarding the possibilities of higher defaults and lower recoveries during the periods of economic stresses. The long-term data take care of the correlation and credit concentration factors also to a great extent. The data on PD and LGD are collected every year, and consequently, the bank will have a more representative set of data when the observation period is 10 years or more.

### Internal Model—Estimation of Unexpected Loss

The EL is the average or the mean loss of the bank's credit portfolio over the chosen time horizon. The unexpected loss (UL) is the amount by which the actual loss exceeds the EL. The PD and LGD at some point of time or in respect to certain exposures may substantially exceed the average PD and LGD estimated on a historical data basis, and the losses in respect of those borrowers will be much more than the model-estimated EL based on the average of PD and LGD. For example, let us take the case of a borrower to whom the bank has sanctioned a short-term credit limit of U.S. $100 million. Suppose the latest risk grade assigned to the borrower is BB. Table 12.5 indicates that the bank will have an average EL for a BB-rated borrower at 0.29 percent of the exposure. Thus, the EL anticipated by the bank in respect to the borrower will be U.S.

$0.29 million or U.S. $290,000, assuming that the credit limit is fully drawn as on the date of default. Suppose the borrower actually defaults in repaying its dues and the bank is able to recover only U.S. $80 million. The difference between the actual loss of U.S. $20 million and the model-estimated EL of U.S.

$0.29 million or U.S. $19.71 million is the UL in the instant case. In this way, the bank can compute figures of UL for a sample of borrowers in each portfolio and compute UL for the portfolio based on standard deviation. The UL on the bank's total credit exposure can be estimated from portfolio-wise UL. UL arises due to the variances in PD and LGD values, and sometimes the UL can be substantially large. The characteristics of UL are described here:

UL is the amount by which the actual losses exceed the expected losses.

UL is a measure of volatility around EL.

UL is mainly impacted by the volatility of PD and LGD values.

The illustrative example given in Table 12.5 shows the methodology for calculation of EL for short-term credit exposure for the manufacturing sector portfolio. Banks should calculate EL and UL separately for medium-term and long-term credit exposures for each portfolio by using counterparty-wise and facility-wise PD and LGD data. They should compile PD, LGD, and EAD data separately for off-balance-sheet portfolios and derivatives portfolios and calculate EL and UL. The total of EL and UL for all types of exposures and all portfolios will generate the bank-wide potential EL and UL.

## BACK-TESTING OF CREDIT RISK MODELS

Validation is more important for the credit risk model than for the market risk model, because inaccuracy in credit risk modeling is likely to affect the financial soundness of a bank. Some credit instruments cannot be marked to market due to the absence of a market for such instruments, and hence significant losses can accumulate in the banking book unnoticed or unaddressed. Validation of the credit risk model is more complex than that of the market risk model, because the size of the banking book of commercial banks, which is the largest source of credit risk, is much bigger than the size of the trading book, and the time horizon for modeling credit risk is much longer. The historical data collection for deriving values of model inputs for credit risk measurement spreads over several years, while one-to two-year volatility data on market variables may suffice for market risk modeling.

The aim of back-testing is to verify whether the ex ante estimation of credit losses is consistent with the ex post actual losses, and the model has worked in the way it was expected to perform. For simplified internally developed models, there are three main areas in which the back-testing process has to be applied:

(1) accuracy of risk grade assigned to a borrower; (2) accuracy of risk-grade- wise estimation of PD and LGD; and (3) accuracy of EAD of different exposures. The bank has to verify whether the ex ante assumptions on the financial and nonfinancial risk factors used in borrower ratings remained valid in the ex post period and whether the risk grade assigned was justified, keeping in view the borrower's current financial position, the behavior of the accounts, and the current risk perception. For example, if a borrower was assigned a AAA rating two years ago and it has now defaulted in its commitments to the bank

under normal circumstances, the credit event is not consistent with the attributes of a AAA rating. This inconsistency between risk grade and expected default probability calls for a reexamination of the risk rating methodology. Likewise, if the model-generated expected and unexpected losses are in significant variance with the actual losses, the methodology followed for estimating PD, LGD, and EAD needs to be investigated, and the procedure suitably modified. This type of back-testing is applicable to credit risk measurement models developed internally by banks, based on historically derived average values of PD, LGD, and EAD under the DM paradigm. In respect to sophisticated MTM models, which utilize a combination of inputs like the credit risk transition matrix, correlation factors, economic factors, joint probability distribution of risk factors, credit spreads, volatility in asset values, and default rates, back-testing involves the application of wide-ranging assumptions and data. Sometimes, back-testing of MTM models is not feasible due to the unavailability of reliable data.

## STRESS TESTING OF CREDIT PORTFOLIOS

Stress testing is a technique to assess the potential vulnerability of a bank if some adverse but plausible events occur or significant adverse movements of financial variables take place. Stress testing measures the extent of economic shocks and other stress situations that the bank can tolerate. It enables the bank to assess the impact of significant but plausible events, first on its credit portfolio and then on its profitability and capital. While conducting stress tests, the bank should be concerned with the significant movement of economic and market variables that have potential to occur and not with day-to-day variations in risk parameters. Stress tests are conducted under the assumption of various plausible stress scenarios with different levels of severity, and the results are used in setting risk limits, allocating capital, managing exposures, and designing contingency plans.

In undertaking stress testing of credit risk, the bank has to identify major elements of uncertainties associated with credit risk modeling and then choose the key variables subjected to test. For example, the uncertainties may relate to situations that significantly influence the values of PD, LGD, EAD, or the joint probability distribution of risk factors. Unfavorable developments in the

economy and adverse movements of interest rates and foreign exchange rates produce a significant impact on the repaying capacity of the borrowers that may lead to an unusual increase in the quantum of nonperforming loans. These types of events trigger larger defaults and generate greater values of PD and LGD that are much above the levels assumed in the measurement models. The bank should subject the credit portfolio to stress tests assuming increases in nonperforming loans by reasonable percentages, evaluate the consequential impact on the financial condition, and take appropriate remedial measures. Similarly, the bank should conduct stress tests with reference to variations in credit spreads, corporate bond spreads, swap spreads, deterioration in credit ratings, shifts in default probabilities, and so on. The bank should subject the commercial real estate portfolio to stress testing with reference to a possible decline in the values of collateral and the exposure to the capital market sector with reference to volatility in bond and equity prices, and evaluate the possible scenarios that may emerge from a fall in property and equity prices. It is also necessary to conduct stress tests of credit and investment exposures in other countries through the assumption of country-specific stress factors. Banks should undertake stress testing of relevant financial parameters at frequencies dictated by the business mix and the risk-bearing capacity at least at three levels of ascending severity— minor, medium and major—and decide the remedial action under each scenario.

Sensitivity tests and scenario tests are the two main techniques employed in conducting credit portfolio stress tests. Sensitivity tests are conducted with reference to a series of predefined moves in a particular risk factor in order to assess the impact on the value of a portfolio. Scenario analysis seeks to assess the impact on the value of the portfolio from adverse movements in a number of risk factors simultaneously, if a significant but plausible event occurs. Scenario analysis is based on historical events that have taken place and have the potential for recurrence and also hypothetical events that are thought to be plausible in some foreseeable circumstances for which there are no exact parallels in history.

An example of a scenario is a sudden economic downturn that affects the credit portfolio significantly. A sudden economic downturn generates three shocks: (1) downgrading of borrowers’ ratings, (2) slippage of performing loans and advances into the nonperforming category, and (3) increase in loan loss provisioning. The bank should conduct stress tests with reference to each of these parameters by varying the degrees of severity of the event (e.g., downward migration of risk grade by one notch and two notches across the portfolio, assuming increase in nonperforming loans by 5 percent, 10 percent, and 15

percent, and increase in loan loss provisioning by 10 percent and 15 percent over the preceding year's amount) and evaluating the impact on its earnings and capital. The bank should periodically review the methodology used and the severity levels assumed for stress testing, identify the issues that emerge from stress test results, and consider those issues in formulating credit risk policy and setting credit risk limits.

## SUMMARY

Banks should develop credit risk rating models to signify counterparty risk level and credit risk measurement models to quantify the potential loss. Models should recognize correlation between risk factors and business activities and capture credit losses during economic recession.

Banks should adopt an appropriate definition of credit loss and select the time zone to measure loss. The broader the definition of credit loss, the more complex the measurement process will be, and the longer the time zone chosen for measurement, the larger the potential credit loss will be.

Once the rating is assigned to a counterparty or a credit facility, the risk rating indicates the likely quantum of credit loss that may arise from the credit exposure in the event of default. There is an inverse correlation between risk rating and quantum of credit loss. The better the rating, the lesser is the quantum of potential credit loss.

Two definitions of credit loss are in vogue among banks. One is that credit loss occurs only when the counterparty defaults, and the other is that credit loss occurs when the credit quality deteriorates, even if there is no default within the selected time horizon. Corresponding to these two definitions of credit loss, there are two types of paradigm for model selection: the default mode paradigm and the mark-to-market paradigm.

The default mode paradigm is a two-state model: the default state and the nondefault state. The mark-to-market paradigm is a multistate model that recognizes credit losses before default if credit quality deteriorates. Potential credit losses are greater under the default mode paradigm most of the time than under the mark-to-market model.

Banks can establish simplified credit risk measurement models based on internal estimates of probability of default (PD), loss rate given default (LGD), and exposure at default (EAD).

PD indicates the possibility of a counterparty defaulting on its obligations within a given time horizon. LGD is the percentage of outstanding dues lost in borrowers’ accounts after the default occurs, and EAD is the expected level of gross exposure at the time of default. Credit loss estimation models require PD, LGD, and EAD for each asset class, each portfolio, and each rating grade.

The availability of default probability data, reliable recovery data, and obligor and risk factor correlation data is the main constraint in developing internal credit risk measurement models. The absence of a secondary market for loans and the unavailability of market values of credit-related instruments and historical prices of credit instruments over a longer time horizon are the other constraints.

The credit risk model generates expected and unexpected losses that serve as inputs for fixing exposure limits, optimizing portfolio concentration, deciding risk-based loan prices and provisions against loan losses, and determining capital allocation.

Expected loss (EL) is the aggregate of potential losses from all types of exposures that involve counterparty credit risk and is calculated as the product of PD, LGD, and EAD and expressed in percentage terms. Unexpected loss (UL) is the amount by which the actual losses exceed the expected loss and arises due to variances in average values of PD and LGD.

Banks should carry out back-testing of internally developed credit risk measurement models to verify whether the ex ante estimation of credit losses is consistent with the ex post actual losses. Likewise, they should conduct stress testing of credit portfolios at three levels of ascending severity—minor, medium, and major—to assess the potential vulnerability under significant but plausible circumstances and put in place appropriate checks and balances.

##### NOTES

1. New Basel Capital Accord, BCBS, paragraphs 461 and 462.
2. New Basel Capital Accord, BCBS, paragraph 417.
3. New Basel Capital Accord, BCBS, paragraphs 468, 470, and 472.

## CHAPTER 13

**Credit Risk Management**

## GENERAL ASPECTS

Credit risk exists in the major activities of a bank and hence, its effective management is crucial for long-term solvency. The primary objective of an effective credit risk management system is to maintain the quality of credit assets and prevent slippage of standard advances into the nonperforming category, since the latter affects the bottom line. Nonperforming advances do not earn, but the bank is required to bear the cost of funds to hold them and make substantial provisions against possible loan losses.

Credit risk management is concerned with the quality of credit before default, and the aim is to maintain the quality of credit over time and monitor those exposures that deteriorate in quality by tracking the migration of borrowers down the rating ladder, because each rating downgrade represents a higher quantum of credit loss to the bank. Credit risk management thus essentially focuses attention on good lending practices to minimize the incidences of default, and on initiation of timely action to arrest the deterioration in credit quality much before actual default. Management of credit risk continues to receive the focused attention of bank supervisors under the risk-based approach to bank supervision.

## CREDIT MANAGEMENT AND CREDIT RISK MANAGEMENT

Credit management refers to the whole process of credit administration, beginning with the grant of credit and ending with the recovery of that credit. It involves sanction, disbursal, supervision, follow-up, and recovery of credit. On the other hand, credit risk management is concerned with the risk the bank faces from credit exposure till the relationship with the borrower is terminated. The aim is to keep the risk within limits and in the process, maximize the risk-

adjusted return on credit exposures. The scale of risk the bank is going to assume from exposures should be consonant with the credit risk management policy of the bank.

Credit risk management essentially deals with the risk from exposures before they reach the stage of default, and it is therefore not management of problem loans or loans that remain unpaid on the due dates. The broad objective is to ensure the quality of credit exposure, minimize the chances of default, and keep the prospects of recovery unimpaired till the relationship with the borrower is terminated. When the borrowers commit defaults in repaying their dues to the bank and the loans become bad, credit risk has materialized and the losses on the credit exposures are going to arise sooner or later. The essence of credit risk management is to set up procedures that assist in selecting good exposures and maintaining credit quality. The procedures should automatically throw up signals when the quality of individual credit or the portfolio begins to deteriorate, so that remedial measures can be initiated in time to prevent default, and if default occurs, to minimize the losses.

Credit risk management is a part of the entire credit management process. The latter is much broader in concept, and the former is a tool that helps in controlling the loss on credit. If there is laxity in credit management, it increases the incidence of defaults and the quantum of credit risk. Credit management encompasses all aspects relating to the selection of borrowers, provision for margin money and collateral support, proper utilization of funds, observance of financial discipline, and adherence to the repayment schedule by the borrowers. It includes supervision of the borrowers’ activities and accounts by the bank. On the other hand, credit risk management seeks to minimize the incidence of risk materialization and the intensity of credit loss through establishment of standards for credit selection, diversification of credit portfolio, avoidance of credit concentration, prescription of prudent limits on exposure size, development of models for risk quantification, and prescription of strategies for risk mitigation. Credit management focuses on improving the prospects of recovery; credit risk management focuses on reducing the probability of default. Credit risk management tools are more sophisticated and complicated than credit management standards.

## CREDIT RISK MANAGEMENT

**APPROACH**

The systems and procedures for managing credit risk assume the greatest significance in the entire risk management process. Credit risk occurs through multiple sources as compared to those from which market risk arises. This is because in an organization, many people operating in many locations are delegated powers for grant of credits, while those who undertake treasury and trading functions that give rise to market risk are few in number and operate in selective locations. The sources and the points of occurrence of credit risk are thus much larger. Thus, the approach to credit risk management should recognize the problems emerging from the multiplicity of personnel handling credit and the multiplicity of operating points at which credits are granted. The choice of credit risk management approach largely depends on the bank's range of activities, the business strategy, the sophistication and the range of products for credit delivery, and the competency of personnel in handling credit products. The approach is also influenced by several other factors like the structure and the level of capital, the business focus (wholesale credit or retail credit), the extent of competition from peers, the product preferences of customers (direct credit lines or credit substitutes), single and group exposure limit policy, related party lending policy, availability of trained personnel for credit administration, and the management's confidence in the staff engaged in credit monitoring and control.

Banks undertake the following activities to establish a comprehensive credit risk management process:

Formulation of credit risk policies and strategies. Development of a credit risk rating framework.

Development of credit risk measurement models. Management of portfolio risk.

Management of credit risk in interbank exposure. Management of credit risk in off-balance-sheet exposure.

Management of country risk in cross-border lending and investment. Development of strategies for credit risk mitigation.

Development of processes for tracking migration of borrower ratings. Establishment of loan review or credit audit mechanisms.

Establishment of methodology for assessment of risk-adjusted return on capital.

Establishment of methodology for capital allocation for credit risk.

Formulation of a loan pricing policy.

## CREDIT RISK MANAGEMENT PRINCIPLES

The Basel Committee on Banking Supervision in the document on “Principles for the Management of Credit Risk” has observed that sound practices for credit risk management address the following areas:

1. Establishing an appropriate credit risk environment.
2. Operating under a sound credit granting process.
3. Maintaining an appropriate credit administration, measurement, and monitoring process.
4. Ensuring adequate controls over credit risk.1

The banks address the above four principles to make their credit risk management practices comprehensive. These practices are applied in conjunction with the other practices enunciated in the Basel Committee document covering asset quality, loan loss provisions and reserves, and credit risk disclosures. The four principles of credit risk management mentioned in the Basel Committee document are explained in the ensuing paragraphs.

### Establishing Credit Risk Environment

The bank should have a document encompassing credit risk management strategy, credit risk policies, and tolerance limits for credit exposures. The board of directors of the bank has the primary responsibility to approve this document, and the senior management is responsible for developing procedures for implementing the policies and strategies. The bank builds up its credit portfolio in pursuance of these policies and strategies and addresses the following operational requirements:

1. What type of credit exposures will the bank accept, and what should be the mix of exposures in keeping with the risk tolerance capacity and the risk-return trade-off policy for optimizing profits? (Exposure types are commercial credit, wholesale credit, retail credit, consumer credit, export credit, and so on.)
2. What should be the economic sector-wise target of dispensing credit, and what should be the limits for exposure to each economic sector (industrial sector, trade sector, capital market sector, real estate sector, agricultural sector, infrastructure sector, etc.)? What should be the geographical distribution of credit within the domestic sector and the overseas sector?
3. What should be the level of credit concentration in specified areas, and what should be the areas of credit diversification? Where are the target markets?
4. What should be the currency-wise and maturity-wise distribution of credit in keeping with the bank's liability profile?

The board of directors should specify the methods for granting credit, conduct an independent review of credit exposures, and assign clear responsibilities for credit administration. The most vulnerable area of credit administration is the implementation of policies and procedures for grant and conduct of credit, since several flaws and aberrations usually occur in that area. The senior management should lay down written procedures for credit sanction and indicate responsibilities for hindsight review, identification of problem credits, and monitoring and controlling of credit risk. This document should describe the process for allowing excesses and making exceptions, and the procedure for reporting.

The implementation framework should address credit risks in all products and activities, also the country risk and transfer risk of cross-border credit exposures. The framework should specify the procedures for identification of credit risk before introduction of new products. It should assign the responsibility for

periodic assessment of the bank's credit granting and credit management functions. The most difficult aspect of implementation is effective communication of credit risk policies and strategies across the organization in a manner that ensures clear understanding of the whole process by the staff with a view to adhering to the documented standards of credit sanction.

### Operating Under a Sound Credit Granting Process

Important aspects of credit operation are the customer selection procedure, the fund disbursement method (to ensure end-use of funds), and the supervision, monitoring, and follow-up procedures. The bank formulates entry-point criteria for sanction of credit and establishes standard terms and conditions covering the lending rate, minimum margin, collateral coverage, and tenure. It should have a set of application forms for collecting all relevant data and information about the borrower for undertaking a comprehensive assessment of his or her risk profile. It should develop standard risk profile templates for the computation of borrowers’ credit risk rating, which should include all factors that are relevant to credit decision making. But the risk rating only indicates the level of risk associated with the credit exposure, which is not enough for credit decisions. The purpose of the credit and the repaying capacity of the borrower are more important, and the self-liquidating character of credit is crucial to sound credit decisions. It is therefore necessary to assess the creditworthiness of the borrower independent of the rating. A low risk rating is not necessarily a guarantee that the credit will be repaid in full and in time. Credit sanction standards may specify the need for borrowers to provide collateral and guarantees for credit risk mitigation, but still it will be erroneous to base credit decisions solely on the strength of collateral and guarantee.

The “Know Your Customer” principle is equally important for establishing credit relationships. Even if the borrower is known to the bank and commands a reputation in the locality, it is necessary to carry out an independent appraisal of his or her creditworthiness and the genuineness of the purpose for which he or she seeks credit. It is wrong to grant credit to individuals or institutions for illegal activities even though the exposure may be of sound quality and highly remunerative. If the bank decides to participate in a consortium or a syndicate for a grant of loan, it should not draw comfort from the credit analysis done by the lead bank or lead underwriter for taking a share. Rather, it should make an independent appraisal of the loan in the same manner it would have done if it

were the sole banker to the borrower.

For establishing a sound credit operation process, the bank needs to set up maximum exposure limits in relation to its capital funds. In keeping with the regulatory prescription and the risk tolerance capacity, the bank should specify the maximum exposure limits for a single counterparty as well as for groups of connected counterparties, and explain clearly the procedure to identify the connected counterparty and related party. Regulators require banks to define “large exposure” and set up a large-exposure ceiling in relation to their capital funds. The bank should establish procedures for aggregation of exposures to individual counterparties across all business activities and aggregation of exposures to the group of connected counterparties with a view to adhering to the “single-borrower” and “group-borrower” exposure norms.

Credit risk mitigation by way of acceptance of collateral and financial guarantee is a part of the credit operation process. The bank should formulate credit risk mitigation and collateral acceptance and management policies. Tangible securities, such as mortgages of land and buildings, plants and machinery, residential property, and the guarantee of individuals or institutions are the two most common forms of collateral. Undoubtedly, collateral protection against credit exposures reduces credit risk, but it should not act as the main driver for credit sanction. Collateral securities, though they offer protection against credit losses, are subject to value erosion and complex enforcement procedures.

An important principle laid down by the Basel Committee on Banking Supervision is that “banks shall have a clearly established process in place for approving new credits as well as the amendment, renewal and refinancing of existing credits.” Banks should clearly define the functional responsibility for credit origination, credit analysis, and credit approval; put in place a structure of delegated powers for credit sanction; and conduct rigorous scrutiny of loans to related counterparties at par with the loans to unrelated parties. They should also set up procedures for renewal and enhancement of credits at specified frequencies and lay down criteria for allowing relaxations and concessions on an exception basis, and by authorized officials.

### Maintaining an Appropriate Credit Administration Process

The bank should establish a credit administration process in keeping with its

size, credit turnover, client composition, and product range and complexity. The credit administration process begins with the identification of the borrower and sanction of credit and ends with the closure of the accounts. In between there are several intermediate procedures to safeguard the quality of credit throughout its life cycle. The sanction or the financial commitment is only the beginning of the credit administration process; the management of subsequent events is crucial to prevent risk materialization.

The core activities under the credit administration process are creation of enforceable documents, completion of legal formalities for establishing charge over collateral, monitoring end-use of credit, watching compliance by the borrower with the terms of sanction and financial discipline, and conducting follow-up and supervision of credit. Often, proper utilization of credit by the borrower is taken for granted, and the procedure connected with credit disbursement is skipped, which is fraught with greater risk of default. A high correlation exists between misuse of credit and probability of default. Misuse negates the purpose for which credit is granted, and it alters the stream of income generation and the cash flows, since activity changes due to diversion of credit. Thus, vigilance over appropriate utilization of funds by the borrower is a crucial aspect of the credit administration process.

Periodic updating of borrower-related records like the loan agreement and other related documents, financial statements and business status, and storing of those data and particulars in the management information system facilitate credit administration. Balanced credit growth, ongoing vigilance over credit portfolio composition, avoidance of credit concentration, and regular analysis of portfolios ensure the soundness of the credit profile of the bank.

### Setting Up a Credit Risk Control Mechanism

Establishment of a rigorous control framework to monitor and control credit risk across the bank including the risk emerging from the affiliated units is essential to manage credit risk. The control framework includes an independent evaluation of the credit administration process, internal review and reporting system, authentication procedure for allowing exceptions, and appropriate checks and balances mechanism. The credit risk control function should cover verification of compliance with the approved credit policies and strategies, the loan sanction standards, and the internal prudential limits. Prompt identification of problem credits is an important element of the credit administration process.

The monitoring and control system should include a suitable mechanism to identify problem credits in time to enable the bank to chalk out debt restructuring and rehabilitation plans.

### Bank Supervisor's Role

Bank supervisors have a special role in ensuring the soundness of the credit risk management systems of commercial banks and financial institutions. The supervisors should set up standards that banks are expected to achieve and specify the parameters with respect to which their examiners will assess the adequacy of the credit risk management system. The resources that banks usually devote to establishing a sound credit risk management system depend on the importance the bank supervisors attach to it and the seriousness with which they assess its effectiveness. The supervisors prescribe the limits on credit exposures within which they expect banks to operate. These prescriptions should include, at the minimum, prudent limits on sensitive sector exposure, large exposure, single borrower and borrower-group exposures (group of connected counterparties), related party exposure, and credit concentration. The supervisors must evaluate the bank's procedures for identification, measurement, monitoring, and control of credit risk. They should periodically review and identify the weaknesses and gaps in the banks’ credit risk management systems and initiate bank-specific measures. The supervisors are responsible for evaluating the banks’ internal capital adequacy assessment process to cover credit risk.

## ORGANIZATIONAL STRUCTURE FOR CREDIT RISK MANAGEMENT

The appropriateness of the organizational structure and the recognition of links between departments are crucial for unbiased assessment and effective monitoring and control of credit risk. The structure should meet the requirements of functional segregation to avoid conflicts of interest. Credit administration and credit risk management are two separate functions and therefore should be kept functionally distinct. At the same time, management of credit risk cannot be viewed in isolation. The organizational structure should not only recognize the need to maintain appropriate links between the credit administration and credit risk management functions, it should also achieve coordination among the credit

risk, market risk, and operational risk management functions as a part of the integrated risk management process. A top-down approach is more realistic in establishing an appropriate organizational structure for credit risk management. The top-down approach covers the approval, coordination, implementation, and reporting functions. The board of directors is the approval authority, senior management is the coordinating authority, middle management is the implementing unit, and the operating staffs at the field level are the reporting units.

The framework of the risk management organizational structure was given in section 4.5 of Chapter 4 of this book. The board of directors of the bank constitutes the first tier and the risk management committee of the board the second tier of the organizational structure. The board and its committee have significant responsibilities relating to risk management functions and are responsible for all matters pertaining to credit, market, and operational risk management. Approval of credit risk policies and strategies, establishment of credit risk limits and exposure norms, allocation of capital for credit risk, and periodic evaluation of the efficiency of the credit risk management system are the core responsibilities of the board.

The risk management committee is an extended arm of the board and a committee of experts who have exposure to risk management techniques and are expected to achieve coordination among credit, market, and operational risk management activities. The committee consists of a few board members and the top officials of the bank, and has the responsibility of approving credit risk management systems and procedures and credit risk measurement models, and overseeing the implementation of the credit risk management policies and strategies.

The credit risk management committee is the third tier of the organizational structure and consists exclusively of bank officials—the chief executive officer, the executive directors, and the departmental heads, besides the chief economist, who is responsible for analyzing the macroeconomic environment, political environment, policy initiatives of the government, and external sector developments, and for guiding the bank about the qualitative aspects of credit growth. The credit risk management committee will act as the recommending authority on credit risk policy formulation and policy modification, and the implementing authority for credit risk policies and strategies. The committee will lay down ground rules for acceptance of loans and exercise of loan sanction powers, make recommendations for fixing limits on exposures and formulating

loan pricing and loan provisioning policies, and approve credit control procedures and practices.

The credit risk management function should be centralized and the responsibility entrusted to one department at the corporate office, which should handle the entire credit risk management activities of the bank. The bank needs to set up a separate credit risk management department not because of the vastness of credit activities, but because of the complexity of the credit risk management function. The credit risk management department should consist of specialists in the areas of risk planning, risk analysis, risk assessment, and credit management systems and procedures. The department will not only provide support services to the higher-level committees, but also develop credit risk models suitable to the bank, oversee the implementation of credit risk management systems and practices across the organization, monitor credit quality, and arrange for credit audit.

## CREDIT RISK APPETITE

Credit risk appetite is the extent to which the bank is able and willing to take risks in the normal course of business in respect to credit and credit-related exposures. In quantitative terms it is the extent of maximum loss on credit exposures that the bank is willing to bear without impairing the benchmark capital level. The risk appetite is determined by the capital level the bank has targeted to maintain in the medium term and revealed through credit risk policies and strategies.

A bank with a high risk appetite will have greater capital strength and ability to raise additional capital and will entertain high-risk credit proposals to a larger extent than banks with a moderate or low risk appetite. Once the bank determines the level of credit risk appetite for pursuing its credit business, the check is exercised by setting up consistent risk limits across the organization, which form the basis for capital planning against credit losses. The bank should take into consideration regulatory prescriptions, targeted credit and profit growth, desired portfolio composition, risk-return matrix, targeted markets, regions, and customers, the basket of credit products, credit processing capability, and credit delivery strength to determine the credit risk appetite.

## CREDIT RISK POLICIES AND STRATEGIES

### Credit Risk Vision

A declaration of credit risk vision is essential for formulation of the credit risk policy. The vision shall be in conformity with the bank's medium-term goal and specify the type and tenure of credits in which it intends to specialize. The bank may specialize in corporate finance, wholesale finance, real estate finance, import-export finance, or retail finance, or intend to dispense all types of credit and increase its presence in international markets. The range of credit activities and the choice of credit tenures influence the credit risk vision, and an appropriate vision helps the bank to maintain a balanced credit portfolio at all times for optimization of risk and return. A balanced credit portfolio means an ideal mix of credit exposures in terms of economic activities, purposes, tenure structure, client size, business locations, and risk profiles of counterparties. The credit risk vision should be based on certain principles that promote stability of the credit operation and discourage reckless and aggressive credit growth.

The credit risk vision document should contain the basic principles for containing credit risk. The suggested outline of the document is given here.

1. Credit risk management procedures and practices shall be proactive and flexible.
2. Credit growth in each year shall be in line with the growth in resources and excessive dependence on borrowed funds shall be avoided to fund credit. Credit portfolio shall be kept diversified at all times.
3. The proportion of long-term exposures to short-term resources shall be kept at the bare minimum, since acquisition of long-term credit assets through short- term resources is fraught with liquidity risk, funding risk, and interest rate risk.
4. Limits on single-borrower and group-borrower exposures, large-exposure and sensitive sector exposure shall be consistent with the regulatory prescriptions and the bank's risk-bearing capability.
5. Aggregate of exposures to single borrowers or borrower-groups in excess of the prescribed limits shall remain within the substantial exposure limit.
6. Consistent standards for credit origination, credit processing, credit sanction, and credit supervision shall exist across the organization. Standards shall include documentation, collateral management, and risk mitigation procedures.
7. Multiple layers of credit approvers for large-exposure, high-risk exposure, and long-tenure exposure shall be in place to achieve greater transparency on credit decisions.
8. The level of authority to approve credit shall be higher than usual when transaction risk increases and credit ratings worsen.
9. Location-wise, sector-wise, and clientele-wise credit concentration shall be kept to a viable minimum. The concentration shall be justified in terms of competitive advantages and product specialization.
10. An internal credit risk rating system shall be established and a rating assigned to each borrower or each facility above a certain exposure size. Where the number of borrowers is large but the amount of exposure per borrower is small, individual ratings may be dispensed with. Instead, small credits may be clubbed together in accordance with the homogeneity of borrower characteristics or purposes of credit and assigned predetermined ratings on a conservative basis.
11. Credit exposures shall be appropriately distributed between different risk grades in accordance with the risk-bearing capacity and risk-return optimization principle.
12. A flexible risk-based loan pricing policy shall be in place to discriminate borrowers in terms of risk rating. Lending rates shall be fixed in accordance with risk ratings, and exceptions shall be made on a selective basis on business considerations or due to market compulsion.
13. The health of credit assets shall be ensured through regular credit audits. Monitoring of credit, detection of early warning signals, and initiation of prompt corrective action shall be essential aspects of credit administration.
14. Portfolio analysis and rating migration analysis shall be regularly undertaken to detect risk concentration and assess credit quality deterioration.
15. A consistent approach toward identification of problem exposures shall be followed and prompt corrective action initiated to minimize the incidences of loan defaults.
16. A rigorous system of checks and balances shall be established for grant and supervision of credit. The credit risk management function shall be kept segregated from the credit approval function.
17. Updating of the management information system to measure and monitor credit risk inherent in on-balance-sheet and off-balance-sheet activities shall be a continuous process.
18. The management information system shall provide adequate information on large exposures, credit portfolio composition, risk-grade-wise distribution, credit concentration, and incidences of defaults.
19. Biannual and annual industry performance studies, individual borrower reviews, periodic visits to plants and business sites of borrowers, and quarterly management reviews of problem credits shall form part of the credit management schedule.

### Credit Risk Policy

The credit risk policy covers the whole gamut of credit risk–related activities, while the loan policy gives an outline of the strategies to be followed for implementing the credit risk policy and specifies the areas of focus for growth of credit during the year. The credit risk policy describes the economic activities, the business lines, the market segments, and the geographical locations in which the bank intends to concentrate during the next few years. The policy indicates the preferences for clients and products, and prescribes entry-point standards, portfolio composition, loan restrictions, exposure limits, and so on.

The credit risk policy should have a long-term perspective and show the appropriate composition of the loan book based on credit risk appetite and capital planning that is beneficial in the long run. Through the policy the bank specifies its strategies for credit growth and alteration in portfolio composition in the light of the emerging scenario. Loan policy deals with the direction of credit in the shorter term, the terms of credit acceptance, the distribution and diversification of credit, and the systems and procedures for credit management. It deals with sector-wise and industry-wise restrictions, entry-exit prescriptions, rescheduling and restructuring standards, and management of nonperforming loans. Loan policy supplements credit risk policy.

The credit risk policy changes every year in accordance with the changes in market conditions and the bank's risk-bearing capacity. The policy guides the field officials in conducting the bank's credit operations and deters them from indulging in imprudent and unjustified lending. The objective of the credit risk policy is not merely to regulate credit within the defined parameters but to maintain the liquidity and the profitability of credit operations, keeping in view the depositors’ interests. The policy prescriptions, when translated and implemented across the bank, ensure that the potential loss from the aggregate credit risk in quantitative terms comprising expected and unexpected losses remains within the allocated capital. The credit risk policy reveals the bank's credit risk appetite and the extent of risk-return trade-off in credit operations.

Corporate governance codes require banks to follow safe and sound practices in conducting operations and to maintain transparency in the decision-making process. The credit risk policy assists the bank in complying with the corporate governance codes. The policy specifies target markets for lending, risk-grade- wise limits for credit acceptance, credit origination and credit administration

procedures, and credit approval powers and responsibilities. The policy also contains procedures for assignment of risk ratings to borrowers and lays down guidelines for portfolio management, impaired credit management, and recovery management. The assignment of responsibilities to designated officials for identification, measurement, monitoring, and control of credit risks in on- balance-sheet and off-balance-sheet items should be specified in the policy.

While formulating credit risk policy, the bank should take into consideration the current outlook of the economy and the likely changes that may take place in fiscal and monetary policies as well as in the economic and business environment. The credit risk policy prescribes the essential requirements to ensure the sanctity of checks and controls, like adoption of a committee approach for sanction of large credit and independence of the internal audit, risk review, and risk assessment functions.

The credit risk policy should include the following inputs at the minimum: Objectives of credit risk management.

Credit risk appetite. Credit risk vision.

Prudent limits, exposure norms, and ceilings. Credit approval procedures.

Country risk tolerance.

Definition and management of large exposure and substantial exposure. Credit risk tolerance standards in investments, off-balance-sheet exposures, and interbank exposures.

Tolerance criteria for rehabilitation and restructuring of impaired loans. Credit risk rating methodology.

Entry-point rating and risk acceptance standards.

Portfolio analysis methodology and portfolio management techniques. Risk-rating and risk-pricing linkage.

Loan review mechanism. Capital allocation for credit risk.

Organizational structure for credit risk management.

### Credit Risk Limits

Credit risk limits specify the extent up to which credit risk can be assumed on credit and investment transactions and in other financial activities. The limits are established mainly in the form of maximum exposure limits and country exposure limits to contain the size of the exposures and avoid undue credit concentration. The exposure limits relate to economic sectors, industrial sectors, a single borrower, and a group of concerns under the control of the same borrower. The bank should establish different types of credit risk limits to keep a check on the total credit business.

The first type of credit risk limits relates to the economic sector-specific limits that specify the maximum amount of exposures that can be made to different sectors like the manufacturing sector, the trade sector, the agricultural sector, the export-import sector, the real estate sector, and the capital market sector. Government policies, economic outlook, business prospects, and regulators’ prescriptions determine the amount of sector-wise limits. Besides, default frequencies and risk-adjusted returns on business in different sectors influence the structure of sector-wise limits. The limits are flexible, vary from year to year, and are even reset within the year, if circumstances so warrant. Sometimes, the central banks or the bank supervisors prescribe a minimum percentage of total loans and advances that banks are expected to lend to certain sectors that are classified as priority sectors or to certain categories of people who are identified as economically weak. These limits are the floor limits that banks are required to achieve, even though the lending to priority sectors or poor people carries higher risk.

The second type of credit risk limits relates to the industry-specific limits, which are usually kept in the range of 10 percent to 15 percent of total credit exposure, but the limits can be higher where the types of industries in a country are very limited. For example, where oil exploration and oil refinement constitute the major industrial setup, industry-specific limits may be substantially higher. For core groups of industries like power, telecommunications, road construction, airports, seaports, oil exploration, and refining, which constitute the infrastructure sector of the economy, higher limits can be fixed as the required quantum of loans is usually large. Consequently, credit risk limits for financing industries in the infrastructure sector are usually higher than those fixed for industries in the manufacturing sector. But banks will

have to be conservative in fixing the limits for the infrastructure sector because of additional risk involved in the tenure of loans, which is usually very long. In deciding the structure of industry-specific limits the bank should take into account the term structure of its liabilities to avoid strains on liquidity arising from duration mismatch of assets and liabilities. Where credit limits required by parties are more than the prescribed limits, syndication of loans or participation by other banks is the solution.

The third type of credit risk limits relates to the sensitive sector-specific limits, which consist mainly of real estate and capital market sectors. In designing the structure of sensitive sector risk limits, the bank should be cognizant of the volatility of asset values and fix the limits based on market conditions and past volatility rates. The limits for financing of activities or assets that are market sensitive or where greater uncertainties exist for income generation should be low. The sensitive sector limit should consist of sublimits in respect to the commercial real estate and capital market sectors, and venture capital and the film and entertainment industry. These limits should be flexible and reset more frequently in response to the signals emerging from credit portfolio analysis.

The fourth type of credit risk limits relates to the counterparty exposure limits, that is, single-borrower and group-borrower limits. Usually, the central banks or the bank regulatory authorities prescribe the maximum counterparty exposure and large exposure limits. The maximum single-borrower and group-borrower exposure limits are usually fixed in terms of specific percentages of the total capital funds of a bank. The off-balance-sheet exposures to a single borrower and group-borrower form part of the specified risk limits. Sometimes, marginal relaxations in single-borrower and group-borrower exposure limits are allowed by the regulatory authorities within the defined boundary of credit concentration. Banks find it practically difficult to administer the group-borrower limit due to the absence of a satisfactory definition of group-borrower. The criteria for defining a group-borrower like minimum percentage of equity holding or preparation of consolidated balance sheet or evidence of control by the same management are often misleading due to the lack of transparency in the corporate relationship. It is possible to exercise control over a group of entities by the same management through the setup of dummy entities. For maintaining the sanctity of the group-borrower limit, it is prudent to treat all entities having links between them by way of equity holdings or intercorporate investment, or entities working under an apparently common management with direct or indirect control, as falling within the concept of group-borrower. The bank's goal

to avoid credit concentration in group-borrowers is best achieved in the long run by disregarding the criteria of majority-holding or minority-holding of equity capital so long as signals are visible that a certain group of entities belong to a group-borrower.

The fifth type of credit risk limits relates to the country-specific risk limits. The New Basel Capital Accord does not recognize all sovereigns as risk-free counterparties for calculation of regulatory capital. The New Accord has prescribed risk weights varying from 20 percent to 150 percent for calculation of regulatory capital on exposures to the sovereigns, excluding those that are assigned AAA to AA– ratings. This requirement to assess sovereign risk is noteworthy in that it recognizes the varying degrees of risk on exposures to the sovereign counterparty depending on the rating. There is some difference between sovereign risk and country risk. The former represents risk from exposures to the government and government-owned companies and the latter, the risks from exposures to all counterparties within the country, which obviously includes private parties. But such differentiation is more academic than real, and from a practical angle, total exposure to all counterparties within a country irrespective of their status should be considered for fixing country- specific limits.

Banks will have to follow a two-way process to fix country risk limits. First, it is necessary to classify the countries into various risk grades (insignificant, low, moderate, high, and very high risk grades), and second, to prescribe maximum country exposure limits either in terms of absolute amounts or a percentage of total capital funds. The country exposure limits will vary due to the differences in risk perception as demonstrated by country ratings. Banks may find it difficult to rate countries through internal models as they will not have access to vital data and information about various countries. They should adopt the ratings of reputed international credit rating agencies and group the countries in accordance with these ratings in separate risk grades. The external ratings may be treated as the benchmark, and banks should use additional data collected from internal and external sources to modify country risk where needed, and reset country risk limits as often as warranted by circumstances.

Limits in respect to off-balance-sheet exposures should also form part of the credit limit structure. Banks should recognize the dangers from high off-balance- sheet exposure, maintain a balance between on-balance-sheet and off-balance- sheet exposures, and fix up a reasonable ceiling on the total off-balance-sheet exposure in relation to the total on-balance-sheet exposure. Fixation of an off-

balance-sheet exposure limit depends on several factors, including the frequency and the severity of devolvement of liabilities from these exposures in the past.

### Large Exposure Limit

“Large exposure” is a relative concept in credit administration, and the definition varies between banks and bank regulatory authorities. Large exposure is usually defined in relation to the capital funds, but conservative banks define an exposure as large when the amount of exposure exceeds a specified sum irrespective of the size of the capital funds. Consequently, some banks recognize an exposure exceeding, say, U.S. $10 million as large, and other banks define an exposure exceeding, say, U.S. $50 million as large. The amount has a direct relation to the exposure size distribution of loans and advances and the risk- bearing capacity of the bank. Conservative banks may consider the aggregate exposure to any counterparty as a large exposure if it constitutes 8 percent to 10 percent of the total capital funds and classify an exposure as “very large or significantly large” if the amount exceeds the specified percentage of capital funds. In order to contain credit risk, the regulators usually place a cap on the aggregate of large exposures in terms of a multiple of capital funds. The credit risk limit framework should include a satisfactory definition of large exposure and a ceiling on the total of large exposures.

Adoption of a rigid definition of large exposure based on a fixed percentage of capital funds disregarding other criteria may sometimes land the bank in serious trouble, if the absolute amount is too large. A flexible definition of large exposure based on varying risk perception (owing to variation in risk characteristics) is more meaningful for controlling credit risk. The constitution of counterparties can be recognized as a factor to determine the size of the large exposure. Moderate exposures to individuals or proprietary or partnership concerns can be classified as large exposure, while for the limited liability companies the exposure size can be significant to be counted as large exposure. Similarly, the risk grade assigned to a borrower can be considered as another criterion for defining large exposure. For example, the medium-size exposure to a high-risk borrower can be classified as large exposure. A risk-sensitive bank should treat the single-borrower, group-borrower, and large exposure limits established in response to the regulatory prescriptions as the outer limits and operate within lower limits.

The identification of large exposure serves two basic requirements of good credit risk management. First, large exposures are subjected to rigorous and intensive follow-up by the credit risk monitoring officials of the bank, which

reduces the chances of default, and second, the number and the total amount of large exposures in the total credit portfolio serve as indicators of the severity of credit risk the bank faces. If the credit portfolio consists of a few exposures of very large size, it carries much more risks than the aggregate of risks from a good number of relatively moderate-size exposures. A genuine concern of bank regulatory authorities is the preponderance of large exposures in the credit portfolios of banks. If the structure of the credit portfolio of a bank is such that a substantial portion of total credit exposure is confined to a few large parties, the position is unacceptable to the bank regulator/supervisor, particularly if the bank is systemically significant in the financial architecture of that country.

## EARLY WARNING SIGNAL INDICATORS

Early warning signals refer to the adverse features that develop in borrowers’ business and accounts that have the potential to lead to credit default. The warning signals are not visible in the normal course, and a diagnostic procedure has to be followed to detect the weaknesses in the financial condition of the borrowers. Detection of early warning signals for initiation of remedial action before the loan accounts turn bad is an integral part of the credit risk management system. Various practices and procedures exist for detection of early warning signals, but banks depend primarily on the structure of the credit portfolio and the clientele-wise and exposure size–wise distribution of credit to establish appropriate systems. There are at least two sets of early warning signals that matter. One set relates to the signals that emerge from counterparty exposure analysis on a stand-alone basis and the other set to the adverse features that emerge from portfolio analysis.

Warning signals are derived from an analysis of operations in the borrowers’ ledger accounts, the balance sheet and other financial parameters, and the business trend including threats to business. The easiest way to identify weaknesses in borrowers’ loan accounts is to analyze the history of the accounts with a focus on the unsatisfactory features. Noncompliance with the terms of credit sanction, noncompletion of documentation requirements, nonadherence to the bank's postdisbursement financial discipline, issuing checks to third parties without funds in the accounts, committing defaults in payment of discounted trade bills on the due dates and in settling liabilities that have devolved on the

bank from off-balance-sheet exposures are examples of unsatisfactory features. Poor operations in the overdraft or short-term renewable accounts of the borrowers, which show sticky tendencies, are symptoms of near default conditions. The identification of these impaired loan accounts offers early scope for rehabilitation and revival of the borrowers’ business units. But exclusive dependence on the analysis of ledger accounts as a tool for detection of early warning signals is not likely to lead to success in many cases, as defaulting borrowers have tendencies to camouflage their accounts through fictitious entries. It is necessary to consider other financial and nonfinancial factors.

The bank should undertake credit quality assessment from four angles to detect warning signals from weakening credit portfolios or subportfolios:

1. Rating migration analysis of borrowers constituting the portfolio.
2. Examination of accounts turning bad too soon after funds disbursement.
3. Evaluation of incidences of defaults.
4. Assessment of variations in the estimated credit losses over the previous periods.

Significant rating downgrades of borrowers, noticeable increase in the number of loan defaults, and rapid erosion in the market value of collateral are some of the warning signals that call for more detailed analysis at the microlevel for modification of loan entry standards and loan exit policies.

A few credit risk models exist that predict business failure or risk of insolvency or bankruptcy of corporations. The models identify the list of counterparties that are likely to go bankrupt soon or commit default on debt servicing obligations. The preparation of the list of borrowing firms that are likely to default is only the beginning of the warning signal detection exercise. The real work lies in undertaking microanalysis of the borrowers’ business affairs and identifying the maladies displayed by the weakened financial ratios and other nonfinancial factors, and initiating remedial action to prevent the slippage of the borrowers’ accounts into the default stage.

The bank should apply both financial and nonfinancial criteria to detect warning signals at the early stage. It needs to maintain a minimum set of parameters that should serve as the benchmark for comparison. Not only strong correlation exists between credit risk and economic factors, but it also exists between credit risk and market risk–related factors, as the volatility of market variables (interest rate, stock price, and exchange parity rate) increases credit risk through a decline in asset values. The bank should be cognizant of these

relationships in preparing the list of financial parameters for comparison. It is an understatement to say that only financial parameters impact the credit quality of counterparties, because banks have ample evidence to show cases where defaults in borrowers’ accounts occurred due to nonfinancial factors, though financial ratios were found to be sound.

Illustrative examples of financial and nonfinancial parameters that a bank needs to examine for detection of early warning signals is given in Table 13.1.

**TABLE 13.1** Early Warning Signal Indicators

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Attribute** | **Trigger Point for Remedial Action** |
| Nonfinancial | Contingent liabilities shown in balance sheet. | Lack of clarity. Inadequate disclosure. Inadequate provision. |
|  | Diversion of funds evident from balance sheet. | Misuse of credit limit. Diversion of funds to associate concerns.  Diversion for other purposes. |
|  | Auditor's qualification of balance sheet. | Material observation by external auditors.  Auditors’ qualifications impair basic accounting practices and alter values of balance sheet items. |
|  | Multiple borrowings by the company. | Borrowings from several banks without justification.  Lack of transparency in borrowings. |
|  | Managerial ineffectiveness | Lack of cohesion between board members.  Dissension among board members/partners.  Market gossip about management. |
|  | Change of management in the company. | Technical knowledge and business experience of new management not known.  Visible lack of integrity and competency.  Commitment of new management below expectations. |
|  | Growth potential of industry financed by the bank. | Growth rate of industry declining. Demand for products falling down. Change in government policy. |
| Financial | Percentage of inventories and receivables to net sales. | Increasing trend. Percentage currently exceeding 33. |
|  | Ratio of total outside liabilities to tangible net worth. | Increasing trend.  Ratio currently exceeds 3. |
|  | Return on capital employed (ROCE). | Declining trend.  ROCE currently below industry average. |
|  | Ratio of current assets to current liabilities (current ratio). | Declining trend.  Current ratio currently less than 1.33. |

|  |  |  |
| --- | --- | --- |
|  | Asset coverage ratio (book value of total assets excluding intangible assets minus total current liabilities and short-term debt obligations) to the total outstanding term debt. | Declining trend.  Ratio currently less than 2. |
|  | Average equity price (last 52 weeks’ average). | Declining trend.  Currently market value significantly less than last 1-year average. |
|  | Debt-service coverage ratio (DSCR). | Under strain.  DSCR currently around 1.5. |
|  | Ratio of operating profit before interest, taxes, and depreciation to net sales. | Declining trend.  Ratio currently 10% or less. |
|  | Servicing of principal and interest on bank loans. | Trend of delayed settlements in recent past.  Delays exceed 2 weeks. |
|  | Invocation of guarantees/ letters of credit. | Incidences of devolvement of liabilities more than expected. Reasons for invocation suggestive of incompetence and bad management. Delays/difficulties in clearing dues after devolvement. |
|  | Earning stability. | Swings in earnings. Low return on assets. |

Financial parameters specified in Table 13.1 are based on average benchmarks applicable to loan sanctions. For example, a minimum current ratio of 1.33 and a debt service coverage ratio of more than 1.5 are the minimum standards the bank expects the borrowers to maintain at all times as long as the relationship continues. When the financial ratios fall below the benchmarks, or the borrower's ledger accounts start showing sticky tendencies, or adverse developments start emerging in the borrower's operating environment, the warning signals have begun to surface and the remedial action should commence.

Identification of warning signals is a continuous process and part of the credit quality monitoring exercise. From a cost point of view, there is no need for a separate administrative setup to handle the early warning signal detection function. The function can be performed within the three-tier administrative setup that banks usually have, the branch office, the controlling (regional) office, and the head office. The branch office is primarily responsible for analysis of borrowers’ accounts and initiation of the warning signal detection exercise during the biannual and annual review and renewal exercise. The corporate office monitors large exposures or significant exposures, the regional office the medium-size exposures, and the branch offices relatively smaller loans and advances to detect warning signals. Besides application of financial and nonfinancial parameters, banks can use suitable credit risk models developed by outside agencies to identify large borrowing entities that are in distress and are

likely to default on repayment obligations soon.

## CREDIT AUDIT MECHANISM

### Objectives and Functions

A credit audit is primarily concerned with the hindsight review of new loan sanctions within a reasonable time from the date of sanction. The main objective of a credit audit is to make an independent review of the quality of new credit assets with reference to the checks and balances put in place by the bank. The review team checks the accuracy of the risk grade assigned to the borrowing entity, examines the quality of the due diligence process, verifies whether the entry point standards have been observed for granting sanctions and documentation formalities completed before disbursement of funds, and whether postdisbursement supervision procedures are being followed by the branch office to protect the bank's interests. The review is carried out with the intent of picking up early warning signals and making recommendations for corrective action. The review should be undertaken within a period of three to six months, and the earlier the review takes place, the more significant is the achievement of the credit audit function. The scope and functions of a credit audit differ between banks due to the differences in the volume and composition of the loan portfolio. The credit audit generally covers new credit sanctions above cut-off limits that vary from bank to bank due to the difference in the volume of total credit. But the credit audit function can be extended to cover existing accounts on a selective basis, more importantly those revolving credits of large amounts that become due for renewal at prescribed intervals. The focus of a credit audit should be on large new loans, but it can also cover medium and large old exposures chosen at random that are continuing in the books of the bank. The objective is to cover through quick audit at least 20 percent to 25 percent of the

total number of medium and large exposures every year.

### Organizational Status

The credit audit mechanism should meet at least four basic requirements:

1. It should achieve purposeful scrutiny of large and medium size new credits soon after sanctions.
2. It should have different focuses of audit and thus avoid duplication of the audit function.
3. It should ensure that the credit audit team is unconnected with the processing and sanction of loans selected for audit.
4. It should ensure that the credit audit team consists of personnel who have a credit processing and credit management background.

The status of the credit audit setup within the organization should be in keeping with its critical role. Banks have a credit department, risk management department, inspection or internal audit department, and sometimes a separate credit monitoring department. Monitoring of accounts is the function of the credit department or the credit monitoring department. A separate setup of the credit audit function is often considered redundant, and consequently, the function is given secondary importance, both in terms of staff adequacy and staff capability. But the credit audit is crucial for containing credit risk in large exposures. The requirement should be met by establishing a separate credit audit cell or department and linking it with the risk management department or the credit monitoring department. Credit audit setup cannot be a part of the credit department as that may give rise to conflicts of interest, nor should it be a part of the inspection or audit departments as it will lose its identity and focus. This will affect the quality and the purpose of special review. The function of the credit audit department will include documentation of audit findings, processing of audit reports, and monitoring of corrective actions taken by the relevant departments. Periodical reporting on the credit audit function to the top management and the board of directors is also one of the functions of the credit audit department.

The internal audit department of banks undertakes regular audits of branch offices and management audits of controlling offices and the head office at periodic intervals. Banks usually follow a discriminating cycle for audit of branch offices. The internal audit team scrutinizes all loans and advances during the audit as part of their routine job. The coverage and focus of the credit audit are different from those of the regular internal audit. The former makes a quick

review of new credit sanctions, particularly of large and medium exposures, from the angle of quality of processing, soundness of decision, and appropriateness of the terms of sanction. This way, the overlapping of functions between the credit audit and the regular internal audit is avoided. But the credit audit unit can also function as a separate setup parallel to the regular audit department for limited audit of large exposures, which were sanctioned in the past but are still live, on a sampling or selective basis. The duplication of functions between the credit audit and regular audit, if old (existing) revolving credits are brought within the purview of the credit audit, is tolerable to a limited extent as a part of the checks and balances mechanism. The internal audit team usually focuses its attention on the deficiencies in credit administration and irregularities that occurred between two cycles of audit, while the credit audit team can have a quick review of the quality of revolving and renewable credits. This minor overlapping of roles may enhance the credibility of the checks and balances mechanism.

## CREDIT RISK MITIGATION TECHNIQUES

Credit risk mitigation techniques are part of the whole credit risk management process. The main objective of credit risk mitigation is to eliminate or reduce the magnitude of actual loss in the event of default, besides minimizing the chances of default on credit exposures to the extent possible. There are a few ways through which credit risks are mitigated, but three methods are more common. These methods are:

1. Traditional method.
2. Credit enhancement method.
3. Credit derivatives method.

### Traditional Method

The traditional method of credit risk mitigation refers to the tightening of credit administration through vigorous implementation of internal rules and procedures. The credit administration process consists of credit sanction, disbursement, supervision, and recovery. Banks have standardized rules and procedures for each of these credit management activities, which need to be scrupulously followed to ensure that credit exposures remain healthy. If any of these activities is not diligently carried out, credit defaults will increase and larger credit losses will occur when the risk materializes. An analytical study of nonperforming loan accounts and an examination of problem exposures will reveal the weaknesses in the credit administration system and the causes for higher incidences of defaults. The conclusions emerging from the analysis will indicate the kind of remedial action required for risk mitigation. It may be necessary to strengthen the loan appraisal procedure, raise the standards of loan eligibility, tighten the loan disbursement procedure to prevent misuse of funds, track the financials of the borrower and monitor the operation in its loan accounts more intensely, and accelerate the recovery process in case of default. These traditional methods of credit risk mitigation are often not given due importance. The bank management draws comfort from the internal audit mechanism and believes that the shortcomings in the credit administration system are rectified through implementation of the internal audit recommendations. But often the internal audit system is found wanting in this regard, as its focus is on detection of irregularities and not on the deficiencies in the systems and procedures that need to be frequently reviewed and modified. Banks hardly try to find out the gaps in the credit administration process by engaging consultants in order to strengthen the systems and procedures and usually look out for other options to mitigate credit risk. Strengthening the credit administration process is like repairing the holes in the system in time to avoid having recourse to more difficult options that may be expensive in the long run.

### Credit Enhancement Method

Credit enhancement takes place in different forms and reduces the credit risk associated with a particular transaction or a set of transactions. A few credit enhancement options are available, but banks should choose the appropriate option keeping in view the kind of response needed under the emerging circumstances. The risk mitigation response can be in relation to a particular customer or a particular type of exposure or a pool of homogeneous assets. Credit enhancement can be achieved through the following means:

1. Loan collateralization.
2. Loan guarantees.
3. Loan syndication or loan participation.
4. Loan insurance.
5. Loan securitization.

In the first place, credit risk can be mitigated through additional collateralization of an existing credit exposure. Credit risk of banks, particularly risks from large and medium exposures that are already supported by collateral, increases when the market values of collateral decline. Consequently, the extent of margin specified at the time of loan sanction decreases, and banks try to contain the increasing risk by revaluing the collateral and increasing the margin money on loans. When market conditions become volatile and values of collateral significantly fluctuate, banks can mitigate risk from the existing exposures through procurement of additional collateral belonging to the borrower, such as mortgage of property or assignment of marketable financial instruments.

Second, credit risk on exposures can be mitigated by obtaining financial guarantees of third parties if there is an apprehension that the credit quality is likely to deteriorate. The financial guarantee can be executed by a corporation, a bank, or a private party. The bank can insist that the directors of a corporation provide financial guarantees in their individual capacity to cover credit facilities sanctioned to the company, or seek the guarantee of the parent company to cover facilities provided to its associate concerns, or a guarantee from the partners of a partnership firm, or even personal guarantees of individual borrowers.

Third, banks can resort to loan syndication or loan participation for credit risk mitigation in a significant way. A group of banks and financial institutions can join together to provide credit facilities to a single borrower or borrower-group.

Where the exposures are very large and for a long duration, like a loan for a big infrastructure project, credit risk can be mitigated through loan participation. In the case of new loans, other banks or credit institutions can be invited by the sponsor institution or the lead bank to take a share through mutual consent. In such situations, the risks from the large exposures are divided between the participating institutions. In respect to large exposures already existing in the books of the bank, other credit institutions can be approached to take a share. The loan syndication or the loan participation method is particularly significant in the case of very large-value exposure, where the quantum of loss, if the default materializes, can be very high in relation to the annual income or the capital of a bank. Loan sharing becomes obligatory if the amount is too large and exceeds the counterparty limit or large exposure limit prescribed by the bank supervisor.

Fourth, credit risk can be mitigated by obtaining insurance on loans from the insurance companies, which will compensate the bank in the event of default by the borrower. This form of risk mitigation is not common, since many countries do not have insurance companies to provide insurance coverage for bank loans. In certain countries where banks are unwilling to make loans to certain sectors like the agricultural sector and small and tiny industries sector because of high risk, a credit insurance corporation or credit guarantee corporation has been set up in the public sector to provide insurance for small loans, though for limited amounts. Nonetheless, the access to a public sector organization providing a credit insurance facility even up to a limited extent is an additional source of credit risk mitigation.

Fifth, credit risk can be mitigated through securitization of a pool of assets. Asset securitization is meaningful only if a bank has a reasonable volume of similar loans that have homogenous characteristics and can be pooled together to form an asset class. For example, car loans, housing loans, real estate loans, credit card receivables, and so on can be clubbed together to form different asset classes for securitization. But all types of securitization do not result in risk mitigation. The asset securitization procedure should be such that the credit risk on the underlying pool of exposures is transferred in whole or in part to a third party, which is usually a special-purpose vehicle or an entity specifically set up for securitization purpose. When credit exposures of the originating bank are legally transferred to the special-purpose vehicle or the specified entity in exchange for cash or securities without future recourse to it, which results in the transfer of credit risk, the risk mitigation objective is achieved.

Another simple form of credit risk mitigation is to ask the borrowers to provide a cash margin or maintain deposit accounts. There should be written agreements between the borrower and the bank for adjustment of deposits held by it against the dues of the former. Usually, banks are given protection through legal enactments for netting of deposits against the outstanding dues of the customers.

### Credit Derivatives Method

The third method for credit risk mitigation is to hedge the risk with the help of derivative instruments. A derivative is a financial instrument that has no independent value of its own and derives value from an underlying asset. Derivatives can be devised with reference to any underlying asset to provide protection against the risk of volatility in price or erosion in the value of an asset or against the total loss of value. Financial engineers can design different types of derivative products to hedge the risk associated with different types of transactions. For credit risk mitigation, banks shall have recourse to credit derivatives to transfer the risk on credit exposure to another party. Credit derivatives can take a few forms and can be synthetically designed to transfer or even eliminate the risk on credit exposures, but their basic structure is confined to three broad types.

The first type of credit derivative is the credit default swap, which is designed to protect the lender from the loss of value on the credit exposure due to the occurrence of any type of credit event. A credit default swap is a derivative contract under which one party agrees to make a specific payment if a negative credit event like a downgrade in rating or default in repayment takes place, or if the counterparty seeks bankruptcy protection or negotiates for restructuring of the debt, in exchange for receiving a premium or a stream of payments at periodic intervals for the specified life of the agreement, For example, two banks enter into an agreement under which the first bank agrees to make periodic payments of a fixed sum during the life of the agreement to the other bank, which makes no payment unless a specified credit event occurs. If any credit event occurs, the second bank makes payment of the agreed sum to the first bank, and with that payment, the credit default swap comes to an end. The size of the premium is determined with reference to the probability of occurrence of a negative event and the expected market value of the reference asset if the negative credit event takes place. But banks will have to assess the financial strength of the credit default swap sellers and their corporate governance and risk management practices, because they may fail to meet their liabilities under the contract, as happened to systemically large financial institutions during the

U.S. financial crisis.

The other type of credit derivative is credit return swap, which provides protection against the loss of income on account of declining credit spreads. A

credit return swap is beneficial under circumstances when the credit spreads on loans or corporate bonds are becoming thinner or, in general, the interest rate is declining. Suppose a bank wants to hedge its interest income on a credit exposure against an assessment that the interest rates on lending are going to fall. The bank will then enter into a swap deal with another counterparty to pay the ruling market interest rate (which is tied to a benchmark rate like LIBOR) on a notional amount at a six-monthly interval against the receipt of a fixed yield for the life of the loan. If the lending rate falls, the bank will protect its interest income. Likewise, there can be a total return swap under which a bank may swap periodic payments on an underlying asset that includes interest payment usually at a floating rate and appreciation in asset value, if any, to be made to another bank over the life of the agreement in return for a total return on the asset that includes interest payments at the benchmark rate plus credit spread and the loss in the value of the asset, if any. The difference between a credit default swap and a total return swap is that, while the former provides protection against the loss on the occurrence of a credit event, the latter provides protection against the loss of value irrespective of the cause. Besides, in a total return swap the interest rate risk is also transferred.

The third type of credit derivative is the creation of credit-linked notes with the base being an individual asset or a pool of assets. In this type of derivative product, the risk on credit exposure is shifted to the investors on the notes who agree to accept a reduced value of the principal amount due on the notes in exchange for a higher yield, if a negative credit event takes place before the maturity date.

Credit derivatives can be widely used as risk mitigation tools if a vibrant credit derivative market exists and there are many buyers and sellers of credit derivative products. Where there are limited numbers of players, all types of credit derivatives for specified notional amounts and periods may not be available or if available, the terms may be expensive. Besides, banks will have to be cautious in selecting counterparties for buying derivative products to hedge credit risk since the latter may fail to honor commitments on schedule under the contracts.

## SUMMARY

Credit risk management is concerned with treatment of risk from credit exposures before default and not with management of problem loans or unpaid

loans. The focus of credit risk management is on minimization of loan defaults and loan loss to the bank. Laxity in credit management increases credit risk and the incidence of credit defaults.

Credit risk exists in banking and trading books and arises from multiple sources as compared to market risk. A credit risk management approach should recognize problems emerging from a multiplicity of personnel handling credit and a multiplicity of operating points at which credits are granted.

Specification of credit granting procedures, standardization of terms and conditions for credit sanction, independent review of credit exposures, prescription of entry-point criteria, establishment of maximum exposure limits and tenure-wise exposure norms, and appropriate demarcation of credit administration responsibilities form the nucleus of the credit risk management process.

The creditworthiness of borrowers should be independently assessed irrespective of the rating grades assigned to them, since a low-risk rating is not a guarantee for return of credit. Related party lending proposals should be subjected to due diligence as applicable to loan proposals of unrelated parties.

Implementation is the most vulnerable area of credit administration since aberrations take place during implementation. “Know Your Customer” principles should be observed in all cases for establishing credit relationships.

The organizational structure for credit risk management should recognize the distinction between credit administration and credit risk management functions to avoid conflicts of interest, but it should achieve coordination among the credit risk, market risk, and operational risk management functions as a part of the integrated risk management process.

Articulation of the credit risk vision and formulation of the credit risk policy and loan policy are the primary strategies for credit risk management. Credit risk vision and credit risk policy guide the field officials to build up a balanced loan book from a risk mitigation angle.

Banks should establish sector-wise credit limits, counterparty exposure limits, country limits, off-balance-sheet exposure limits, and large-exposure limits to manage credit risks. They should devise an effective warning signal detection mechanism to identify incipient sickness developing in borrowers’ business units and accounts at early stage for remedial action.

Banks should establish the credit audit function to make an independent review of the quality of new credit assets soon after sanction.

Banks should choose appropriate options to mitigate credit risk in accordance with emerging circumstances. They should strengthen credit administration procedures to reduce chances of default, and take recourse to credit enhancement and credit derivatives to mitigate, transfer, or even eliminate credit risk.

##### NOTE

1. “Principles for the Management of Credit Risk,” BCBS, September 2000. Readers may refer to the original document for details.

## CHAPTER 14

**Credit Portfolio Review Methodology**

## PORTFOLIO CLASSIFICATION

Portfolio management is concerned with both investment and credit portfolios. The investment portfolio consists of a few subportfolios, such as the sovereign security portfolio, corporate bond portfolio, equity investment portfolio, mutual funds portfolio, and so on. Management of the investment portfolio is concerned with the protection of investment values against the volatility of market variables. Credit portfolio management deals with the evaluation of each portfolio at periodic intervals to judge the quality of assets held in the portfolio and protect them from losing values through appropriate corrective action in time. For managing the credit portfolio, banks may divide its total credit assets into different portfolios or subportfolios

Banks may decide the composition of portfolios keeping in view the nature and the distribution of its loans and advances. They may classify total credit exposure into purpose-wise, sector-wise, borrower-type-wise, or even product- wise portfolios. It is, however, advantageous to classify large credits into sector- wise portfolios, like infrastructure sector, manufacturing sector, trade sector, and real estate sector portfolios, and relatively medium-and small-size credits into retail portfolios, like residential housing loan portfolio, auto loan portfolio, personal loan portfolio, education loan portfolio, and credit card portfolio. Retail portfolio management is relatively easier due to the simplicity of the facility structure that consists of one or two loan products, the homogeneity of retail borrowers, who are mostly individuals, and the smallness of the size of loans. Corporate credit portfolio management is more complex due to the complexity of facility structure and the lack of size-wise, purpose-wise, and tenure-wise similarity of loans granted to them. It is difficult to group corporate loans into convenient lots for portfolio analysis based on the homogeneity of characteristics, and therefore, the bank has to admit heterogeneity of borrower characteristics and facility characteristics in managing corporate loan portfolios.

## PORTFOLIO MANAGEMENT OBJECTIVES

The primary objective of credit portfolio management is to detect in time the deterioration in portfolio quality and avoid undue concentration of exposures in the portfolio that may contain hidden and large credit risk. The objective is to build up a broad-based credit portfolio through rational distribution of credits among a large spectrum of customers. Credit portfolio analysis enables banks to develop balanced portfolios and contain overall credit risk by redirecting credit to relatively less risky and more gainful business lines. The conclusions emerging from portfolio analysis help the bank to determine the future strategies for credit growth. Through regular portfolio analysis the bank can identify credit subportfolios that are likely to worsen in quality.

Portfolio review objectives and portfolio analysis implications are narrated in Table 14.1.

**TABLE 14.1** Portfolio Review Analysis

|  |  |
| --- | --- |
| **Objectives and Implications** | |
| **Portfolio Review Objectives** | **Portfolio Analysis Implications** |
| Track migration of credit assets down the ladder in the chosen portfolio. | Migration analysis shows whether the risk grades assigned to borrowers in a particular portfolio are deteriorating at an unusual rate. Conclusions help the bank to modify loan sanction standards and loan exit norms. |
| Optimize benefits from diversification of loan portfolio. | Evaluation of portfolios shows which are the most adversely affected and which are the most gainful business lines. Conclusions enable the bank to diversify its business and optimize returns. |
| Reduce potential adverse impact of loan concentration. | Analysis shows which portfolio is having concentration that is likely to be adversely affected soon. It helps the bank to reduce concentration in that portfolio in time. |
| Adopt appropriate strategies for future build-up of credit portfolio. | The conclusions enable the bank to choose strategies for development of incremental business, keeping in view the emerging concerns. |
| Adopt flexibility in risk management policies. | Analysis helps the bank to identify the risk factors including market risk factors (capital market, money market, interest rate and exchange rate volatilities) that are generating greater incidences of loan defaults. This helps the bank to modify its risk management policies and strategies. |
| Achieve appropriate risk-grade-wise distribution of exposures in the portfolio to contain the magnitude and the quantum of credit risk. | Evaluation of each portfolio in terms of risk-grade-wise distribution of borrowers indicates the overall quality of the portfolio.  If portfolio analysis reveals preponderance of high and very high-risk borrowers, the bank can modify the portfolio composition in phases to bring down the overall credit risk. |
| Measure performance of portfolios in terms of risk-adjusted returns. | Evaluating the portfolios from risk-return angle reveals the performance and efficiency of each portfolio. Conclusions help the bank to choose better options for incremental business without pressure on additional capital. |

## PORTFOLIO MANAGEMENT ISSUES

The bank should examine the portfolios from two angles. First, the bank should evaluate the change in portfolio quality through rating migration analysis, and second, assess the change in the portfolio health through study of variations in potential losses over a period of time. The bank may address the following issues to set up an effective portfolio management mechanism:

* + 1. What shall be the criteria for deciding the composition of portfolios if it has a wide variety of loans and advances, clientele-wise, purpose-wise, and tenure- wise?
    2. How should the necessary data on counterparty rating, probability of default, loss rate given default, and exposure at default be generated, if there are large numbers of borrowers and large numbers of small loans for a variety of purposes?
    3. What methodology should be adopted to achieve greater objectivity in portfolio evaluation since the data on counterparty correlation and volatility of asset prices are usually not available? These data are most often not reliable also.
    4. What should be the norms for measurement of concentration in portfolios?

The first issue relates to the selection of criteria for deciding the portfolio composition. The commercial banks’ loans and advances are widely distributed among numerous clients, and their credit portfolio consists of a large number of revolving credits and term loans. Besides, within the broad manufacturing sector portfolio, there are subportfolios like steel sector, cement sector, chemicals sector, power sector, and petroleum sector portfolios. The bank has to consider whether it should evaluate the manufacturing sector portfolio as a whole or evaluate subportfolios. The first option is better because of similarities in borrower and facility characteristics between different subsectors and the evaluation parameters that will be applied may not materially vary between them. But the small and medium enterprises sector consists of thousands of credit exposures of heterogeneous nature; agricultural and allied agricultural sectors consist of huge numbers of loans for diverse purposes; and the personal loan sector comprises loans for residential housing, purchase of cars and consumer durables, equity share acquisition, higher education, and so on. In such situations, it is inappropriate to form broad portfolios by clubbing together a few subportfolios because of the lack of homogeneity in borrower characteristics and facility characteristics. It is better to form subportfolios like housing loan

portfolio, car loan portfolio, consumer durables loan portfolio, agricultural loan portfolio, small industries portfolio, and evaluate them separately. But certain constraints arise in applying portfolio analysis techniques to these subportfolios, because the individual ratings of all borrowers in subportfolios will not be available to study the rating migration nor the risk-grade-wise data on probability of default, loss rate given default, and exposure at default to estimate potential losses and calculate risk-adjusted returns on subportfolios. It is difficult for the bank to compile these data on an individual borrower basis, because of the multiplicity of borrowers and huge number of small loans involved in the process. The bank can compile data on ratings and risk components (probability of default, PD; loss given default, LGD; and exposure at default, EAD) on an average basis for each subportfolio on a random sampling basis.

Eventually, the bank may classify credit portfolios into two categories—broad portfolios like infrastructure sector portfolio, manufacturing sector portfolio, trade sector portfolio, export sector portfolio, and relatively smaller portfolios in the retail sector. In respect to broad credit portfolios, the bank should build up borrower-wise rating data and risk-grade-wise data on probability of default, loss rate given default, and exposure at default, and study risk migration and variations in the quantum of potential losses associated with the portfolios over a period of time to assess the change in the portfolio quality. In evaluating the retail sector portfolios, the bank may compile the risk rating of a good number of individual borrowers in each group on a random sample basis to assess the overall quality of the subportfolio and the changes in quality over a period of time. The bank can construct the risk-grade-wise distribution of retail sector subportfolios based on risk rating and risk component (PD, LGD, and EAD) data pertaining to samples of borrowers comprising the portfolio and estimate the potential losses on the basis of average values. The average of the risk component data should be applied for evaluation of a particular subportfolio representing a homogeneous borrower-group, like borrowers in the residential housing sector.

The second issue relates to the selection of the method for estimating counterparty correlation and volatility of asset prices. Correlation between two counterparties refers to the degree of impact on one counterparty when adverse conditions affect the other. Eventually, both of them may default on their obligations to the bank simultaneously. Let us assume that there are two large corporations, one in the steel sector and the other in the automobile and automobile ancillary sectors, promoted by two separate industrial groups.

Suppose there is a huge fall in the demand for automobile products due to substantial increase in oil prices. This will simultaneously reduce the demand for steel products and consequently, the production and income generation in both these industries will decline, and both the counterparties are likely to default on their loan obligations. The increase in oil prices has adversely affected both the two corporations simultaneously due to the correlation between the two industries, though they are owned by separate and unrelated industrial groups. The resultant effect is the concurrent deterioration in the quality of the steel sector and the automobile sector credit portfolios owing to the increase in oil prices. Despite diversification of the loan portfolio to avoid concentration, the correlation between the two segments of the manufacturing sector affects the performance level and the portfolio quality simultaneously. High correlation between the borrowers impairs the portfolio quality faster.

Reliable data on counterparty correlation and portfolio correlation are usually not available. If there are specialized institutions or government agencies that publish data on correlation between industrial sectors and portfolios, banks can use such data for portfolio evaluation. There is no simple methodology for estimating credit correlation. Efforts have been made to estimate correlation between defaults and bond market spreads in the developed financial markets and utilize the results for establishing correlation between counterparties in a given portfolio. This approach may not be feasible in most of the cases, since reliable data on bond ratings and corporate bond market spreads are available to a very limited extent. The bank can, however, internally estimate credit correlation data through assessment of the impact on the counterparties from adverse changes in macroeconomic factors. The stress tests of the debt-servicing capacity of individual borrowers belonging to different portfolios can be conducted under different macroeconomic scenarios and the resultant impact mapped to estimate correlation between counterparties and portfolios.

The third issue is about the standardization of norms for measurement of portfolio concentration. Some banks have developed special expertise over a period of time and designed special products to provide loans in selected business lines. They want to leverage this expertise and create a niche market for their products, and build up a large portfolio in a particular business line. If the expected default frequency of a portfolio is small and the risk-adjusted return is relatively high, even a large portfolio cannot be considered unsafe from the credit concentration angle. Nevertheless, such a large portfolio is subject to risk that may arise from changes in economic factors such as economic slowdown or

unfavorable changes in government economic policies. Conservative banks whose risk appetite is moderate may set up lower limits for defining loan concentration. If the aggregate of exposures in a particular portfolio exceeds 15 percent of total credit, they may classify that portfolio in the category of moderate concentration. Banks with high risk appetite and having expertise in providing special types of loans at competitive terms may prescribe a higher ratio for classifying credit concentration. Banks should set up an acceptable definition of loan concentration, taking into account their strengths and weaknesses, and after assessing the opportunities and the threats. The total exposure ceiling of a portfolio need not be too low, as working at a level below the optimum may result in customer loss, business loss, and profit loss. At the same time, too much leveraging of expertise to build up concentration in the chosen business line is fraught with high risk.

## PORTFOLIO ANALYSIS TECHNIQUE

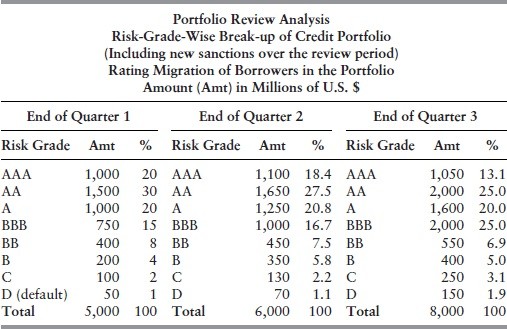
The methodology for undertaking portfolio analysis is suggested in the following section.

### Mapping Rating Migration

The first step for portfolio analysis is to assess the impact of rating migration of the borrowers on the portfolio. The bank may choose a particular portfolio, assign a risk grade to each borrower in the portfolio using its internal risk rating model, and work out the percentages of exposures in each risk grade to the total credit outstanding in the portfolio for three or four successive quarters or half- years. The percentages of credit exposures in each risk grade (AAA, AA, … BBB, BB, C, etc.) over the review period are tabulated and compared to determine the extent of deterioration in credit quality in that portfolio. The comparison will reveal the shift in the portfolio quality in terms of borrower rating migration (say, 3 percent of borrowers migrating to risk grade BBB from risk grade AA) and change in risk-grade-wise exposure (say, the quantum of exposures held in risk grade AAA falling from 15 percent to 13 percent). The change in risk-grade-wise exposure will indicate whether the portfolio quality has improved or deteriorated over the review period. If there is a decline in percentage of exposures, particularly in low-risk grades, the bank has to identify borrowers’ accounts that have slipped to higher risk grades and critically

examine the reasons for migration (decline in quality). Whether the portfolio reviews should be undertaken quarterly or half-yearly will depend on the portfolio size and the change in the quality of exposures as revealed from previous analyses.

Illustration of rating migration of borrowers in a portfolio is given in Table 14.2.

**TABLE 14.2** Manufacturing Sector Portfolio

(The amount of exposure in a risk grade represents the total of exposures to each individual borrower, rated and placed in that risk grade.)

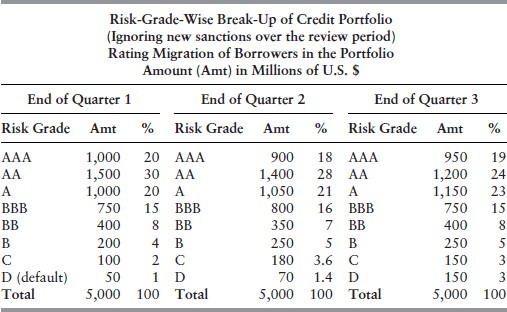
Note that loans and advances in risk grades AAA (very low risk) and AA (marginal risk) within the portfolio have come down from a total of 50 percent to

38.1 percent of total exposure from the end of quarter 1 to the end of quarter 3, and those in risk grade A (low risk) have remained around 20 percent over the review period. The borrower-wise scrutiny of the portfolio will reveal that some of the borrowers rated in risk grades AAA at the end of quarter 1 have migrated to higher risk grades to AA, A, BB, … C (downgraded) at the end of quarter 3, and some other borrowers have migrated from higher to lower risk grades, from A to AA, AA to AAA (upgraded). There will be movement in the borrower ratings in both directions, from lower to higher risk grades and vice versa. Table

* 1. reveals that the overall credit quality of the portfolio has deteriorated over a period of six months (from the end of the first quarter to the end of the third quarter). This deterioration in the health of loan accounts implies that the bank needs to hold more amounts of capital on account of increase in risk weights due

to downgrading of risk ratings and make more provisions against increase in potential loan losses. For better comparison of risk migration of borrowers, the new sanctions that have taken place from the beginning of the first quarter to the end of the last quarter may be ignored and data pertaining to old (continuing) borrowers separately tabulated risk-grade-wise to judge the rating migration and movement of portfolio quality.

Ignoring the new sanctions over the three quarters, which aggregate U.S. $3 billion, the rating migration of borrowers comprising the portfolio is shown in Table 14.3.

**TABLE 14.3** Manufacturing Sector Portfolio

An analysis of the portfolio reveals that the amount of low-risk category exposures (aggregate of exposures in grades AAA, AA, A), which constituted 70 percent of the total exposure in the portfolio, has come down to 66 percent during the six-month period, and the percentage of default category loans has increased from 1 percent to 3 percent. Overall, the portfolio has weakened during the six-month period, though not significantly, and the bank will have to study the cases of individual borrowers at random and identify the factors that are affecting credit quality. An analysis of the factors that have pushed the ratings downward will indicate the kind of remedial measures that the bank will have to take in individual cases, particularly large-exposure cases. But the focus of portfolio analysis is to evaluate the change in portfolio quality over a period of time and make decisions on the future direction of loans falling within the portfolio. The bank will have to assess the relative strength of the portfolio in a

risk-return perspective and decide whether it will continue to add further loans to the portfolio or reduce the exposures over a period of time.

### Mapping Default Frequency

The second step for portfolio analysis is to make a frequency assessment of loan defaults by borrowers in a portfolio. The bank should compile risk-grade-wise data on defaults by borrowers in each portfolio over the chosen time period, and map and analyze the data. If the incidences of defaults in a particular portfolio are relatively higher in relation to other portfolios or much above the average default rates of loans (historical average based on three to four years’ data) in the bank and there are no extraneous reasons of a temporary nature justifying the increase in the default rates, the bank should take measures for restructuring the portfolio over a period of time. The bank should at the same time raise entry- point standards, including enhancement in down payment and collateral support, for sanction of new loans in the relevant portfolio.

### Mapping Loss Severity

The third step for portfolio analysis is to make a severity assessment of estimated potential losses of portfolios over the review period. The bank may derive the amounts of expected losses from the total exposure held in each portfolio using the credit risk measurement model and then study the variations in estimated potential losses associated with the portfolios over the chosen review period and identify the portfolio where the severity of potential loss is greater. If the bank uses an internal model for estimation of potential loss on the credit exposures, the probability of default and the loss rate given default parameters used for loss estimation should be, at least, averages of five-to seven- year default-related data applicable to the portfolio as recommended in the New Basel Capital Accord. Shift of credit exposures to worsening risk grades, in which the probability of default and loss rate given default are relatively higher, implies that the quantum of potential losses in the relevant portfolios has increased, and the portfolio requires additional capital support.

### Evaluating Correlation Effect

The fourth step for portfolio analysis is to make an assessment of the impact on a portfolio on account of correlation between borrowers or even portfolios. If the

bank has exposures to different types of industries, it will have to assess the impact on the value of an industrial subportfolio on account of its correlation with another industrial subportfolio. The bank will apply the risk-grade-wise borrower rating and risk component data (PD, LGD, and EAD) to the exposures in all subportfolios, study the rating migration and variation in potential losses over a period of three to four quarters or half-years, and identify the subportfolios that are deteriorating in quality and whether those have correlation with other subportfolios. The loans and advances in an industrial subsector where the credit exposures are standard and performing will also decline in value due to the emergence of adverse developments in another subsector that has correlation with the former industry. For example, if there is a slowdown in the construction industry on account of falling property prices and the quality of exposures in the construction sector is deteriorating, the bank has to assess the values of exposures in the iron and steel industries, cement industry, paints industry, and so on, since there is correlation between these industries, find out the severity of impact, and initiate a package of remedial measures to prevent further deterioration in the quality of the subportfolio.

### Estimating Exchange Risk Impact

The fifth step for portfolio analysis is to make an impact assessment of foreign exchange risk on the foreign currency portfolio, because the depreciation in foreign exchange rate impairs the repaying capacity of borrowers who have taken foreign currency loans or have other types of foreign currency exposures. The foreign currency loans are repayable either in foreign currency or the domestic currency equivalent of the amount due in foreign currency at the exchange rate prevailing on the due date. On account of significant increases in the volume of cross-border transactions and the increase in the volatilities of financial market variables in many countries, exchange rate risk has increased significantly. If the domestic currency depreciates, the repayment obligations of borrowers who have foreign currency exposures, but who do not have earnings in foreign currency or have not taken cover against exchange risk, increase substantially in terms of domestic currency, and many of them are likely to commit defaults. The bank should therefore evaluate the effect of depreciation in exchange rate on the foreign currency credit portfolio under different scenarios. The bank may separately group the borrowers who have taken foreign currency loans into a subportfolio and assess the impact from the angle of borrower rating

migration and the consequential change in risk-grade-wise composition of the portfolio, and make an estimate of the increase in potential loan losses.

### Undertaking Stress Tests

Credit portfolio management involves accomplishment of three tasks—to undertake rapid portfolio reviews, conduct stress tests and scenario analysis of each portfolio, and assess the volatility of asset values under different sets of assumptions. The bank should make reasonable assumptions like general slowdown in the economy, unfavorable changes in fiscal and monetary policies, adverse movements in interest rates and foreign exchange rates, and conduct stress tests of different portfolios under different sets of assumptions. The bank should work out the potential erosion in asset values under different stress situations and restructure the portfolios to minimize the impact from plausible adverse scenarios.

### Strengthening the Management Information System

Portfolio reviews require borrower-wise rating data, risk-grade-wise potential loss data, and other supplementary information to evaluate the current quality of the credit portfolio and the future scenario that may emerge. The bank should identify the gaps in information for conducting effective portfolio reviews and continuously upgrade the management information system.

## PORTFOLIO RISK MITIGATION TECHNIQUES

### Choosing Risk Mitigation Options

Portfolio risk mitigation techniques are not basically different from general credit risk mitigation techniques. The bank takes stock of the options available for risk mitigation and chooses the best option to respond to the exact concerns emerging from portfolio analysis. To a certain extent, regulatory directions to banks to establish sensible counterparty limits, sector-wise limits, sensitive sector limits, and credit concentration limits, besides insistence on compulsory diversification of credit portfolios prevent the development of large, vulnerable portfolios.

Portfolio risk can be mitigated through portfolio-specific action, borrower- specific action, and an asset securitization program. First, if evaluation of a particular portfolio reveals that it is likely to weaken over a period of time due to the emergence of certain economic factors or external factors on which the bank has no control, it may tighten the entry norms for new loans to discourage the potential borrowers and liberalize the loan exit norms to facilitate earlier liquidation of dues by borrowers or transfer risk to other institutions through an asset sale. Second, the bank may direct the mitigation action toward the individual borrowers within the portfolio that is deteriorating in quality, either by asking them to provide additional collateral support, or intensifying monitoring and follow-up action on loans, or inviting other financial institutions to share the loan, or obtaining guarantees and insurance on loans. Third, the bank may undertake asset securitization of certain types of loans, like car loans, residential housing loans, consumer durable loans, and so on, to achieve reduction in the volume and value of the portfolio. The asset securitization should be done with appropriate legal protection so that it results in effective transfer of risks to the special-purpose vehicles.

### Enhancing Collateral Management Practices

#### Formulating a Collateral Management Policy

Collateral management has immense significance for mitigation of credit risk, because collateral is of no use if its value is not realizable within a given time frame. Banks accept collateral in a routine manner without being aware of the complications involved in enforcing the collateral. The collateral disposal procedure is so time consuming and complicated that eventually the risk mitigation element of the collateral is lost. One constraint is the prohibition from the court on distressed sale of collateral, which delays the disposal as buyers willing to offer a fair price are scarcely available, and the other constraint is the indecision on the part of the loan officers to enforce the collateral due to the lack of transparency of internal policies on collateral disposal. Often, the loan officers delay the enforcement on one pretext or another, sometimes in collusion with the borrower. The New Basel Capital Accord allows a wide range of credit risk mitigants for capital relief, which include collateralization of transactions, netting of deposits against loans, and protection of unconditional guarantees and credit derivatives. It is therefore necessary for the bank to formulate policies on

credit risk mitigation and collateral management.

In order to seek collateral support from the borrowers as a risk mitigation strategy, the bank has to frame policies regarding acceptance and management of collateral. The policy document should dwell on the various aspects of collateral management and provide first-hand knowledge to the operating staff regarding handling of the collateral. The bank's declared policy on collateral requirement and collateral acceptability infuses transparency in the terms and conditions of loan sanctions. The collateral management policy shall include, at least, the requirements discussed in the following paragraphs.

#### Defining Collateralized Transactions

Usually a collateralized transaction is defined as a loan transaction that is hedged in whole or in part by collateral offered by the counterparty or a third party on behalf of the counterparty. The policy should include an appropriate definition of collateralized transaction, clarity on the bank's specific lien on the collateral, and the legal position of its right to enforce the collateral and apply the value to settle outstanding dues under on-balance-sheet and off-balance-sheet facilities, if the borrower defaults.

#### Prescribing Collateral Acceptability Norms

The policy should specify the types of collateral and the kind of charge that the bank will have in relation to the particular collateral. The collateral is a security or protection against the outstanding dues of the borrower, and it can be primary, secondary, or supplementary. Primary collateral is the asset created out of the credit facilities extended by the bank, which the borrower is obliged to offer to it as security by way of pledge, hypothecation, or mortgage, and is usually in the form of mortgage of residential property or factory land and buildings, pledge of goods and merchandise, hypothecation of machinery, consumer durables, and cars, and so on. The secondary or supplementary collateral is generally in the form of savings instruments, equities and bonds, life insurance policies, personal guarantees, and so on, and is taken by banks in addition to primary collateral where dues are large or risk is greater, or as a protection against loans if there is no primary collateral.

Many banks do not frame separate collateral management policies though the practice of insisting on collateral for grant of credit is widely prevalent. Consequently, the acceptance of collateral often becomes a formality to comply

with the lending standards and is not viewed as an effective instrument for credit risk mitigation. Banks should formulate a collateral management policy and specify the collateral that may be accepted and those that may not be accepted. Normally, tangible and easily disposable collateral is given preference over other types of collateral, and least priority is attached to collateral whose value is highly volatile or which belongs to third parties.

### Establishing a Collateral Management Procedure

The bank should prescribe methods to value financial and nonfinancial collateral, and clearly state its policy regarding insurance and inspection of collateral. It should prescribe the quantum of margin that borrowers should maintain at all times and ensure that they restore the specified margin in the event of shortfall. Under the New Basel Capital Accord, banks are required to enhance the value of exposure to the counterparty as well as reduce the value of collateral by way of haircuts to take care of possible future fluctuations in exposure amount and collateral value. The document on collateral management should specify the percentage and methodology for application of haircuts.

The bank should specify the documents required to establish its charge on the collateral, because often its right to enforce collateral is challenged in the court of law due to defective or inadequate documentation. Contractual agreement in the prescribed format, security delivery letter, title deeds and mortgage deeds, declaration from the parent and the guardian in case of a minor holding interest in the collateral, confirmation letter from the company or competent authority about the genuineness of financial instruments if these are offered as collateral, assignment letter from the insurance company in case of assignment of life insurance policies, and the like are examples of documents usually taken by banks. Appropriate documentation shall be done in accordance with the provisions of law governing the type of collateral in question.

The bank should lay down proper procedures for safe custody of collateral and regular monitoring of its status. It should have a system of memorizing the maturity dates of financial collateral so that their values are realized on the due dates. Enforcement of collateral is often complicated, since there are various types of laws that govern enforcement of different types of collateral. The bank should therefore lay down the enforcement procedure to avoid allegations by customers about the distressed sale of collateral or application of coercive means or adoption of dubious methods to realize collateral values that may impair its

reputation or draw it into courts of law.

## SUMMARY

The primary objective of credit portfolio review is to detect in time the deterioration in portfolio quality, avoid undue portfolio concentration that may contain hidden and significant credit risk, and mitigate overall credit risk by redirecting credit to relatively less risky and more gainful business lines.

Banks should establish criteria for deciding portfolio composition and norms for identifying portfolio concentration in order to establish appropriate portfolio evaluation mechanisms.

Banks should compile portfolio-wise data on counterparty rating, probability of default, loss rate given default, and exposure at default to estimate potential losses from portfolios. High correlation between borrowers within the same portfolio or between different portfolios erodes portfolio quality faster. Consequently, data on counterparty correlation and portfolio correlation are essential for portfolio evaluation.

Portfolio evaluation involves examination of portfolios from two angles— tracking changes in portfolio quality through borrower rating migration analysis and estimating variations in the quantum of potential losses from the portfolio over the review period. Portfolio reviews involve mapping of rating migration data, default data, and potential loss data at successive quarterly or half-yearly intervals in order to assess how the portfolio quality is changing over the review period.

The effect of correlation between counterparties and portfolios and the impact of adverse exchange rate movements on the portfolios should be assessed as part of the portfolio evaluation process.

Portfolio risk mitigation techniques are not basically different from general credit risk mitigation techniques. Banks should take stock of risk mitigation options available and choose the option to respond to the exact concerns emerging from portfolio analysis.

## CHAPTER 15

**Risk-Based Loan Pricing**

## LOAN PRICING CONCEPT

The risk-based loan price reflects the return on a risk-free asset, plus a risk margin, which should be adequate to compensate the bank for the entire gamut of risks assumed by it. Risk-based loan prices take into account different elements of risks, including default risk, rating migration risk, credit correlation risk, credit concentration risk, collateral risk, and recovery risk. The most dominant factors that influence the loan price are the probability of default and the loss rate given default that reflect the probable loss from credit risk.

The key factor that determines the risk-based loan price is the quantum of potential loss that can arise from the exposures to a counterparty. The default characteristics of loans and the varying scales of recovery when default occurs set the platform for discriminating between counterparties in fixing the lending rates. Prior to default, it is not possible to say with certainty which borrowers will default, but we can make an inference about the possibility of a borrower committing default by looking at its current risk rating and fix the lending rate accordingly.

## LOAN PRICING PRINCIPLES

The general principles that can be followed in determining the risk-based loan prices are explained here:

* + 1. Rating grades assigned to borrowers should be the basis for fixing lending rates on loans and advances. The bank may rely on its own internal risk rating framework for fixing the risk-based price of loans to medium enterprises and small borrowers and use ratings of reliable external rating agencies, where available, for large and significant borrowers.
    2. The interest rate on loans should be so fixed that loans rated as the least risky generally carry the lowest rate and those rated as the most risky carry the highest rate. The lending rates, which lie between the two extremes, should be

calibrated within a predetermined range. The difference in lending rates between the most risky and the least risky loans, that is, the range of risk margin, should be in alignment with banking industry practices.

* + 1. The potential loss on credit exposure is the prime factor that determines the risk-based loan price. The internal ratings of borrowers, the default probability rate, and the loss rate given default are the critical inputs in determining the risk margins. The economic capital required to support credit risk–related activities and the expected (risk-adjusted) return on capital are the other two important factors that influence the loan price.
    2. The tenure of loans and the repricing interval of funds that support a pool of term loans influence the lending rate. The uncertainties in sourcing funds involve additional costs. Consequently, the cost of funds, which may have to be occasionally outsourced to correct asset-liability mismatches, will have to be taken into account in fixing the lending rate.
    3. While fixing risk-based loan prices, the bank has to make distinction between the qualities of loans placed in different risk grades, because the incidence of default and the quantum of loss vary between risk grades. AAA- rated loans are likely to cause the least amount of loss to the bank and in very few cases. Likewise, A-rated loans may generate low amounts of loss and in only a few cases, while BB, B, and C category loans may generate greater losses and in several cases.
    4. The risk-based loan price should carry a penalty clause that may be made applicable in the cases of prepayment of loans and low utilization of sanctioned credit limits.

## LOAN PRICING ISSUES

Banks should examine and resolve the following issues in order to establish appropriate procedures for fixing risk-based loan prices:

1. The first issue is about the availability of reliable data to calculate the quantum of expected loan loss, which is an input for determining credit spreads for fixing the loan price. Various models exist to calculate expected loss, but if banks want to measure credit losses through internal models in line with the New Basel Capital Accord recommendations, they will have to build up data on the probability of default, loss rate given default, and exposure at default for each asset class and each risk grade for a period of five to seven years.
2. The second issue is about the methods for calculation of unexpected loss from credit exposures and its inclusion in loan price computations. Banks usually ignore the unexpected loss component in fixing loan prices, because it is difficult to make a fair estimate of unexpected loss. Studies have shown that the idiosyncratic default risk or the risk of unexpected loss is real and does exist. Banks shall therefore derive the unexpected loss through the credit risk measurement model and include it in loan pricing. Usually, there is a built-in cushion in risk-based loan prices that takes care of unexpected losses, since banks use credit spreads slightly higher than market-related credit spreads in fixing the loan prices.
3. The third issue is whether the risk-based loan prices should be strictly followed for all kinds of loans and advances. There are a few types of loans where the lending rates are fixed on an ad hoc basis because of market competition. This principle is usually followed in the case of retail loans having similar facility characteristics or loans against easily realizable collateral or for specified purposes. Banks can fix lending rates for these types of loans purpose-wise, exposure-size-wise, and tenure-wise, taking the risk-based loan prices as the benchmark. Banks may charge higher rates on medium-size exposures and on loans for speculative purposes and for longer tenures, and lower rates on relatively small exposures and on loans for productive purposes and for shorter tenures. But the risk-based price for each category of loans should be kept in mind while fixing the final rate so as to make a minimum profit from lending.
4. The fourth issue is about the obligation to lend at rates lower than the risk- based rates for selected customers due to market compulsion. Banks can work out the minimum lending rates on the basis of “no profit, no loss” criteria for loans falling into different risk grades and add minimum spreads to the indicative “no profit, no loss” rates to fix the chargeable rate for selected customers. From the angle of interest rate risk management, it is prudent for banks to avoid lending at rates below the “no profit, no loss” cut-off rates except to the extent that they have to lend to low-income people under the bank supervisors’ directions. Banks will have to ensure that the lending rates are at least higher than the “no profit, no loss” rates by some margin even for selected customers. Sometimes, for public sector enterprises and other corporations which are financially very sound and which are rated in the AAA, AA, or A categories, banks can fix lending rates that are at least equal to “no profit, no loss” rates on a case-by-case basis because of business compulsion, particularly

if there is potential for getting large non-fund-based business from those customers to compensate for the loss of interest income.

1. The fifth issue relates to the extent up to which funds can be lent at “no profit, no loss” rates or at rates marginally higher than those, but lower than risk-based loan prices, if banks are compelled to do so for a variety of reasons. Banks may fix a ceiling up to which they will lend funds at such rates, and in fixing the ceiling, they should take into account the low-cost funds available with them, since the cost of funds is the major element in risk-based loan pricing. The ceiling can be a portion of the corpus comprising the current account deposits where no interest is payable, the core (semipermanent) portion of savings account deposits where low interest is payable, the lower-tenure low-cost time deposits, the core amount of interest-free float funds, and the procured funds at economic rates. The average of these funds over a 12-month period can be taken as the maximum amount of funds that is available for lending at relatively lower rates; a portion of the corpus may be lent at rates equal to or marginally higher than “no profit, no loss” rates to minimize the loss on interest income.
2. The sixth issue refers to the extent up to which banks should calibrate the risk-based loan rates to match the risk rating scale. Is it necessary to fix a risk- based loan price for each risk grade, if there is minor variation in risk perception between two risk grades, particularly the adjacent risk grades? It is not pragmatic to follow a rigid risk-based loan pricing formula under the eight- scale or seven-scale credit risk rating framework. From a practical angle, it is convenient to classify the borrowers into broad risk categories and place the risk-based loan rates into three or four slabs. Risk grades showing marginal or minor differences in risk scores and risk perception can be conveniently grouped into broad risk categories. For example, seven risk grades adopted under a seven-scale rating framework can be grouped into four risk categories

—low risk, moderate risk, fair risk and high risk, and the risk-based loan rates placed in four slabs. There can be provision for minor adjustment in the rates on an ad hoc basis in respect to fair risk and high risk category borrowers. The fixation of loan price on a broad risk category basis is operationally more convenient. The minor variations in lending rates may also reduce the feeling of discrimination among the customers, enhance their loyalty, and increase the market share of business. An illustrative example of grouping of the risk grades into broad risk categories for fixation of risk based loan price is given in Table 15.1.

1. The seventh issue relates to the extent of variations that can be made in risk- based loan pricing on account of the loan maturity factor, other things remaining unchanged. Is it necessary to fix separate risk-based loan rates for short, medium, and long-term loans? In fixing the lending rates, banks need to be cognizant of the higher risk involved in longer term loans. To a certain extent, higher risk associated with the loans of longer maturity is included in the risk grade, since facility characteristics that include the tenure of loans are factored into the counterparty rating process. But the better option is to downgrade the risk rating of borrowers who take medium-and long-term loans by one notch because of the additional risk involved in the loans of longer maturity. For fixing lending rates on medium-and long-term loans, banks may take into account the additional cost of long-term funds and load some additional risk premium linked to the tenure of the loan.

**TABLE 15.1** Computation of Risk-Based Loan Price

|  |  |
| --- | --- |
| **Grouping of Risk Grades** | |
| **Broad Risk Category** | **Risk Grade** |
| Low risk | AAA and AA |
| Moderate risk | A and BBB |
| Fair risk | BB and unrated |
| High risk | B and C |

## LOAN PRICE COMPUTATION

Risk-based loan pricing implies that the lending rates increase with the increase in risk from credit exposures. The risk rating of borrowers, which reflects varying degrees of risks between risk grades, is the basis for determination of the rate applicable to each risk grade. Though risk-based loan price computation is basically an arithmetical process, bank-specific, facility-specific, and risk mitigation–specific factors influence the final lending rate. The size of the bank and its market position, sources of funds, loans to deposits ratio, historical cost- income ratio, targeted return on assets, and the extent of credit portfolio diversification are bank-specific factors. Facility structure, purpose of the loan, quantum and quality of collateral, tenure of loan, prepayment penalty provision, and right of loan recall are facility-specific factors. The scope of loan syndication or loan participation by other banks, availability of insurance or guarantee, and availability of derivative products for interest rate risk hedging are risk mitigation–specific factors. All these factors influence the lending rates.

The risk-based loan price consists of the following components:

1. Fund cost.
2. Service cost (operating cost).
3. Capital cost (opportunity cost).
4. Risk premium (cost of expected and unexpected losses).
5. Income spread (tax burden, provisioning requirement, and profit margin).

Illustrations of risk-based loan price computation are given in Tables 15.2 through 15.7. The figures of assets and liabilities given in the tables are hypothetical.

**TABLE 15.2** Risk-Based Loan Pricing

|  |  |
| --- | --- |
| **Computation of Fund Cost** | |
| **Average cost of funds = [Interest expended (Interest paid on deposits + interest paid on borrowings + interest paid on bonds and debentures + accrued interest) ÷ Interest bearing liabilities] × 100** | **U.S. $ (Million)** |
| Interest on deposits | 1,300 |
| Interest on borrowings (call and money market borrowings, refinance from central bank, export-import bank, and other refinancing agencies) | 300 |
| Interest on bonds and debentures | 215 |
| Total interest expended | 1,815 |
| Interest bearing liabilities† | 40,000 |
| Average cost of funds | 4.54% |
| \*Interest bearing liabilities represent all liabilities, including deposits, borrowings, refinance and bond proceeds, and any other item on which interest is payable.  †Simple average of month-end balance sheet figures for 12 months included in the accounting year. | |

The risk-based loan price shown in Table 15.7 relates to fund-based credit facilities; the bank can work out the rates for non-fund-based credit products, taking into account service cost, regulatory capital cost based on credit conversion factor, risk premium (expected and unexpected losses), and some profit margin. The risk-based loan price shown in column 9 of Table 15.7 does not include an unexpected loss component. The income spread of 3%, which is slightly higher than the market-related credit spread, includes an element of unexpected loss. The quantum of unexpected loss can be separately determined based on the targeted confidence level. The risk-based loan price shown in Table

15.7 has been computed risk-grade-wise under the default mode model taking into account the entire credit exposure of the bank. The bank can work out a portfolio-wise risk-based loan price for each sector (manufacturing sector, infrastructure sector, trade sector, commercial real estate sector, export sector, agricultural sector, capital market sector, and retail sector).

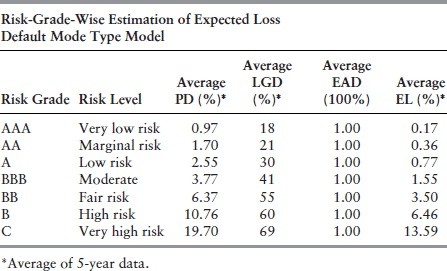
**TABLE 15.3** Risk-Based Loan Pricing

|  |  |
| --- | --- |
| **Computation of Service Cost** | |
| **Service cost = (Total operating expenses ÷ Lendable resources as on account closing date) × 100** | **U.S. $ (Million)** |
| Operating expenses | 510 |
| Lendable resources (deposits, bond proceeds, and borrowings, excluding refinance, minus statutory obligations like minimum cash reserve to be maintained with the central bank and minimum investment in sovereign papers toward liquidity requirements) | 35,000 |
| Service cost | 1.46% |

**TABLE 15.4** Risk-Based Loan Pricing

|  |  |
| --- | --- |
| **Computation of Capital Cost** | |
| **Opportunity cost of regulatory capital with CRAR target at 10% (CRAR = capital to risk-weighted assets ratio)** | **As on Balance Sheet Date** |
| Tier I capital | 70% |
| Tier II capital (subordinated debt instruments) | 30% |
| Cost of Tier II capital at annual coupon rate | 7.00% |
| Tax rate | 30.00% |
| Posttax cost of Tier II capital [Cost of Tier II capital × (1-tax rate)] | 4.9% |
| a. Risk-free return (yield on 5-year sovereign security) | 6.00% |
| b. Cost of Tier I capital based on expected return on allocated capital invested in selected band of equities in the capital market, rated bonds, mutual funds, *etc.* (assumed at 15.00%) | 15.00% |
| Weighted average cost of regulatory capital (70% of cost of Tier I capital + 30% of posttax cost of Tier II capital) | 11.97 % |
| Opportunity cost of regulatory capital (cost of regulatory capital minus yield on 5-year sovereign security), i.e., 11.97% minus 6.00%, assuming that allocated capital can be invested in risk-free sovereign security at 6% | 11.97% –  6.00% =  5.97 % |
| Opportunity cost of regulatory capital with targeted CRAR of 10% = 10% of 5.97% | 0.60%  (rounded off) |

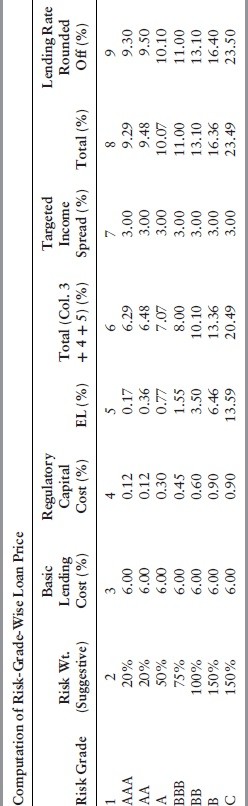
**TABLE 15.5** Risk-Based Loan Pricing



**TABLE 15.6** Risk-Based Loan Pricing

|  |  |  |
| --- | --- | --- |
| **Computation of Basic Cost in Lending** | | |
| Average fund cost | Table 15.2 | 4.54% |
| Service cost | Table 15.3 | 1.46% |
| Basic cost |  | 6.00% |

**TABLE 15.7** Risk-Based Loan Pricing



Column 9 of Table 15.7 shows the risk-based lending rates based on expected loss for each risk grade. Banks usually fix a prime lending rate, which serves as the minimum lending rate, that is, the risk-based loan rate applicable to AAA

rated borrowers, and build up the lending rate structure around that rate. In fixing the risk-based lending rate, banks take into account the number of risk grades in the risk rating scale and determine accordingly the interest rate band to cover all borrowers from the lowest risk to the highest risk categories. The prime lending rate will be applicable to the lowest risk category borrower and the prime lending rate plus the maximum of the interest rate band to the highest risk- rated borrowers. But the lower end and the higher end of the interest rate range can be at variance with the risk-based lending rates due to the influence of other factors like the central bank policy, the interest rate outlook, the market trend, the liquidity condition, and competition from peers. A risk-based loan price cannot be applied mechanically to high and very high-risk–rated borrowers as the applicable rates will be unreasonably high due to the high percentage of potential loan losses in these two categories. It is necessary to fix the maximum lending rates for high-risk category borrowers at a level that may be lower than the risk-based rate.

## 15.5 SUMMARY

The risk-based loan price reflects the return on risk-free assets plus the risk margin. The most dominant factor that influences the risk-based loan price is the quantum of potential loss that can arise from the credit exposure. Default probabilities of loans and varying scales of recovery when default occurs set the platform for discriminating between borrowers in fixing risk-based lending rates. Rating of borrowers is the basis for varying the lending rates. The maximum interest rate band between the least risky and the most risky credit exposure should be in alignment with banking industry practices and the regulatory prescriptions. The additional cost in procuring funds to support long-tenure loans

should be included in the lending rate.

The risk-based loan price should be granulated in accordance with the risk grade included in the rating scale. However, for operational convenience, lending rates can be linked to broad risk categories instead of each risk grade of the rating scale. Exceptions can be made in fixing the risk-based loan price due to market compulsion and longer maturity of the loans.

Risk-based loan pricing implies that the lending rates increase with the increase in credit risk, but risk grade alone is not the sole basis for deciding the final rate. Size of the bank, risk appetite, targeted return on assets, historical

cost-income ratio, and extent of credit portfolio diversification determine the final rate. Furthermore, collateral coverage and risk-mitigation opportunities also influence the lending rate.

# PART Three Market Risk Management