

Business Risk in Banking

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ABSTRACT: Business risk in banking encompasses a wide range of potential threats that can negatively impact a bank's operations, financial health, and reputation. These risks arise from various sources, including credit risk, market risk, liquidity risk, operational risk, and regulatory risk. Credit risk arises from the potential default or non-payment of borrowers, while market risk relates to fluctuations in interest rates, exchange rates, and asset prices. Liquidity risk refers to a bank's inability to meet its obligations due to a shortage of funds, while operational risk encompasses internal failures, fraud, and system disruptions. Regulatory risk arises from non-compliance with laws and regulations governing the banking industry.

KEYWORDS: Compliance Risk, Credit Risk, Cybersecurity Risk, Default Risk, Foreign Exchange Risk, Fraud Risk, Interest Rate Risk.

INTRODUCTION

Risk in banking refers to the possible loss that might happen to a bank as a result of certain events taking place. The ambiguity around occurrences that have the potential to result in loss gives birth to risk; an event may or may not occur, but if it does, it will result in loss. Although it may happen as a result of other operational events, risk is largely a component of financial transactions. It is determined by the likelihood that an asset's value or price will fluctuate in relation to its existing value or price. When it comes to managing risks in the banking industry, we are mostly concerned with the potential for loss or drop in asset values due to situations like economic slowdowns, negative changes to trade and fiscal policies, unfavorable movement in interest rates or exchange rates, or declining stock prices. Banking risk has two components: uncertainty, or whether a negative event will occur, and impact intensity, or how much money will likely be lost if the event does occur. Risk should not be seen as an individual or an isolated incident; rather, it is basically a social feature. When a sequence of transactions is carried out, some of them may result in losses for the bank even if every transaction carries some level of risk [1]–[3].

Wide-Ranging Categories of Risks

Business risks and control risks are the two main types of hazards that banks must deal with. Business risks are inherent to the industry and result from the occurrence of certain anticipated or unanticipated events in the financial markets or the economy, which depreciate asset values and, as a result, lower the bank's intrinsic worth. If a company fails, the money lent to a customer might not be repaid, the market

value of bonds or stocks might fall due to rising interest rates, or a forward contract to buy foreign currency at a specified rate might not be settled by the counterparty on the due date because the exchange rate has changed. These kinds of commercial hazards are a given in the banking industry. The three main company risks—credit risk, market risk, and operational risk have many facets and so need for a thorough management. In the subsequent chapters of this book, these dangers are discussed in more depth. The term "control risk" describes the insufficiency or failure of a control that is meant to limit the scope or magnitude of business risk or stop the spread of operational risk. Lack of comprehension of the complete business process is the root cause of inadequate control, whereas the control staff's complacency or laxity is the root cause of failure in control. Let's assume that the bank's internal model predicts an average loan loss of 5% for its credit portfolio. If credit sanction and credit monitoring are not well controlled, the real loan loss will be more than 5%. The amount of credit risk will be larger than predicted by an internal model if the loan sanction criteria is violated, collateral is not collected in line with the established standards, or inadequate control over the monitoring of borrowers' businesses and accounts prevails. If the control system is unable to promptly identify the abnormalities, business risk will increase. Banks are required to have a complex control system that covers investment, credit, and other operational areas.

Financial risk and nonfinancial risk are two more categories into which the hazards may be divided. While non-financial risks have an indirect impact on the financial situation, financial risks cause loss to a bank directly. Financial risks include credit, market,

and operational risks since they directly affect a bank's financial condition. The bank will suffer a loss if it sells the bond in the market, for instance, if the market value of the bond it bought falls below the acquisition price. Nonfinancial risks include reputation risk, legal risk, money laundering risk, technological risk, and control risk since they have an indirect negative impact on the bank. Nonfinancial risk examples include business prospects missed and subsequently lost revenue due to bad press about a bank that damages its reputation or compensation given to a client in reaction to a negative court ruling against the bank.

While nonfinancial hazards are often not measurable, the effect of financial risks may be quantified in numerical terms. Through scenario analysis, the effect of nonfinancial risks may be evaluated and classified as low, moderate, or high in terms of severity. While control risk is just a nonfinancial risk since it affects a bank indirectly, business risks include both financial and nonfinancial types of hazards. The evaluation and management of both financial and nonfinancial risks are therefore key components of risk management in the banking industry. Bank supervisors and regulators warn financial institutions against the perils of risk avoidance and urge them to comprehend the ramifications of both financial and nonfinancial risks and adopt strategies for risk assessment and management.

A typical danger may come from many different places. Loans and advances, investments, off-balance-sheet things like derivative products, and cross-border exposures are a few examples of where credit risk may arise. Like interest rate fluctuations, which influence exposures in trading and banking books, bond, equities, and commodity prices, as well as changes in the foreign exchange rate, all result in market risk. Sometimes the lines between various risk categories are hazy. Losses brought on by narrowing credit spreads might be either losses from credit risk or losses from market risk. Market risk and credit risk can mix. For a bank, income risk and capital risk are not dangers in and of themselves. They are the two financial variables that take the brunt of the loss caused by risks coming to pass. The ultimate objective of risk management is to reduce the effect of business risk and control risk on the capital and profitability of banks.

DISCUSSION

Credit Risk

The Basel Committee on Banking Supervision has defined credit risk as the possibility that a bank borrower or counterparty will fail to fulfill its obligations in accordance with the agreed terms.¹ Credit risk, also known as default risk, results from the uncertainty surrounding the counterparty's timely repayment of the bank's dues. The likelihood that the counterparty would default on the bank's credit exposure and the potential damage to the bank should the counterparty fail are the two components of credit risk. Inadequate revenue or company failure are the typical causes of default. However, it is often intentional because the counterparty, although having sufficient wealth, is reluctant to fulfill its commitments. A reduction in the value of credit assets prior to default that results from a fall in portfolio or individual credit quality is sometimes referred to as credit risk.

What Indicates Credit Risk?

Both the loss in the value of the credit asset and the loss in the profits from the credit are considered types of credit risk, which refers to the volatility of losses on credit exposures. Assume a bank lends a client \$1 million in the United States at a rate of 5% a year, with repayment due in eight quarterly payments starting one year after the loan's origination. A risk grade, either obtained from an external rating agency or developed from the bank's internal model, indicates the credit risk associated with the exposure of \$1 million USD. The rating given to the borrower will indicate if the exposure has a high, moderate, or low degree of risk. The rating will provide a general notion of the counterparty's likelihood of defaulting on its repayment obligations during the loan's life or within a certain time frame. The amount of potential loss for the bank will need to be evaluated independently using the risk measurement approach. Credit risk has already manifested in the event that the counterparty fails to make the required payments of US \$1 million plus interest on time, in whole or in part. It makes no difference whether the default is purposeful or accidental. The bank will lose both principle and interest if the counterparty fails to make the installment payments at the agreed-upon interest rate. However, if he or she accepts to pay back the principle and asks the bank to partially or completely waive the interest required on the loan due to insufficiency of income, there has been a loss of earning on the credit. Credit risk therefore refers to the possibility of a partial

or complete loss of the loan's principle amount and negotiated interest payments [4]–[6].

Medium Credit Risk?

Credit risk comes in varying degrees of intensity. The danger of missing a principle and interest payment is the one that is the most serious. When the counterparty's creditworthiness deteriorates, the market value of the credit exposure decreases, creating an intermediate credit risk. Credit risk manifests in this case as a rating downgrade. Credit risk may be considered to have manifested prior to the incidence of default when the credit quality worsens. The current risk grade given to the exposure allows one to determine the level of credit risk. When an asset is placed up for sale in a market where loans are exchanged between lending institutions, a decline in credit quality will result in a lower price. An intermediate type of credit risk is the projected decline in asset value prior to default.

"Country risk," which refers to the chance that a sovereign nation would be unable or unwilling to pay its obligations to foreign lenders, is another component of credit risk that results from cross-border financing and investment. The danger is higher in nations with shaky financial systems, weak economies, and inadequate regulatory oversight. Country risk results from exposures to the sovereign government as well as private borrowers who live in that nation but have taken out loans from banks abroad. Due to restrictions placed by the government on the conversion of domestic currency into foreign currency as a result of the depletion of foreign currency reserves, or as a result of a very unfavorable movement in the foreign exchange rate that significantly raises the amount that must be repaid in domestic currency for foreign currency loans. Political or economic policy changes may also result in the default. Sometimes the borrower who is based in a foreign nation will not make a repayment or the government itself may renege on its obligation.

"Market Risk"

Market risk is described by BCBS as:

1. The possibility of financial losses in either on- or off-balance-sheet positions due to changes in market values. The following hazards are covered by this requirement:
2. The risk associated with securities and instruments in the trading book that are tied to interest rates.
3. The bank's exposure to commodities and foreign currency risk.

Market risk is the potential for a decrease in asset or earnings market values as a result of shifting market conditions. Market risk results from financial transactions carried out by banks to increase their holdings of financial assets or take positions knowingly in the hope of profitable swings in interest rates, exchange rates, and bond/equity prices. Banks may accumulate stakes in commodities futures, foreign currency forward contracts, shares of stock, and other off-balance-sheet products.

Organizational Risk

Operational Risk: What Is It?

Operational risk is described by BCBS as "the risk of loss due to insufficient or ineffective internal processes, people, and systems or due to external occurrences. Operational risk is sometimes referred to as "residual risk" and occurs in almost all departments of the bank, including the credit department, investment and funds department, treasury, information technology department, and so on. This definition includes legal risk but excludes strategic and reputation risk.

Operational Risk Factors

Operational risks have a wide variety of causes, and it is difficult to compile a comprehensive list of all of them since sometimes the risk comes from unanticipated and unforeseen sources. We can comprehend why risks resulting from ineffective people, processes, and systems, as well as from outside events, are categorized as operational risk if we are clear about the origins and sources of credit and market risks. People-related risks are caused by incompetence, improper staffing, and the abuse of authority. The bank is at risk if employees handling particular transactions lack the knowledge or technical know-how to handle them, if employees in sensitive positions are known to lack honesty and integrity, or if employees abuse their authority to sanction loans. Employees may engage in fraud on their own or in concert with third parties, or they may get unauthorized access to systems and manipulate or modify data and information. All of these instances will result in financial loss for the bank due to the dishonest and improper behavior of its staff.

Process-related hazards originate from the potential for mistakes in data transfer, data retrieval, or output or result correctness. Executing complicated transactions like option pricing, currency swapping, or interest rate switching might include process risks. Payment and settlement errors may happen as a

consequence of incorrect data processing or message and data tampering during the processing and transmission stage, which may lead to an excessive payment. Decisions regarding loans and investments may also be made incorrectly as a result of the production of flawed results. For instance, consideration of the counterparty's risk rating is important when deciding whether to make substantial loans or investments in bonds. A party's rating grade may be incorrect as a result of a model or processing mistake. The model's results may not accurately depict the situation as it really is. The "process" element of operational risk is responsible for the hazards associated with various kinds of process-related mistakes.

Banks rely on computer systems to run their business smoothly, but the gear and software that process and store massive amounts of data daily are very susceptible. In the course of the bank's daily operations, a number of scenarios occur that provide significant levels of risk. An event that disrupts the operation of the bank might be the breakdown of the computer system or the telecommunications system, the malfunction of an automated teller machine, an outsider hacking the computer network, or a programming mistake. The bank eventually suffers losses as a result of these events. The "systems" element of operational risk might be attributed to the hazards that result from these kinds of occurrences. Operational hazards resulting from outside occurrences like an earthquake, a flood, a riot, a break-in, looting, etc. are clear and don't need more explanation.

Operational risk results from a variety of occurrences and circumstances that happen daily in banks. Based on definitions, it is impossible to properly link the risks from these incidents—which pertain to either the people, the process, or the systems—to credit and market concerns. It is impossible to claim with absolute certainty that these three operational risk sources are independent of one another and do not interact. The most plausible hypothesis is that these three components are interdependent, and operational risk often results from their combined consequences. When a bank starts doing business with a client, the procedure outlined in the operation manual is used to start the transaction, the personnel process the information to analyze the transaction and make decisions, and the computer system underpins the procedure to provide the service. The three operational risk sources are intertwined, making it sometimes difficult to identify the precise cause.

Understanding Operational Risk

In the past, banks have had a lot of experience with operational risk occurrences. This is clear from their zeal to find operational areas that are weak and to take extra precautions to close any gaps. Banks have consistently worked to improve the processes for making credit and investment choices, lessen abnormalities in transaction processing, and stop numerous occurrences of fraud in the past. They have given areas that are vulnerable to fraud, such as the security of the computer network system and the reconciliation of books of accounts, special attention. The results of internal and external audits prompted the implementation of these preventative measures. However, there hasn't been a methodical strategy to handle operational risk completely. Operational risk has not received the same attention from bank management as credit risk and market risk. Operational risk is distinct from other business risks in that it is present regardless of the bank's projected return on investment. It has a strong potential for causing significant losses, and failing to acknowledge the risk completely will skew a bank's real risk profile.

Risk to Operating Environment

The economic, political, social, legal, and regulatory contexts are all part of the operational environment. Banks analyze their operating environment and create business strategy. Banks find it incredibly challenging to create realistic business strategies that are feasible in the current climate due to fierce competition in the financial services industry. Different approaches are needed for various kinds of customers, marketplaces, and goods. In addition to technical inadequacy, a lack of knowledge, and a delay in service delivery, banks face the danger of experiencing a loss of business owing to the incompatibility of business strategy with business potential and environment [7]–[9].

Changes in macroeconomic and microeconomic conditions expose banks to operating environment risks. Slower economic development, excessive inflation, an unfavorable balance of payments position, high interest rates, and limitations on the money and capital markets all affect the business climate. The abrupt introduction of new regulatory and supervisory guidelines also places restrictions on banks. One of the key elements influencing corporate development and profitability is the environment. High fiscal deficits, rigorous regulatory constraints, and environmental changes that cause movements in asset values are a few of the main ones. Additionally, the government sometimes offers instructions to banks

for meeting minimum lending goals in certain economic sectors, such as residential housing, agriculture, and small-scale industries, or desired demographic categories, such as low- and middle-income individuals. Additionally, banks are constrained by consumer preferences, a small selection of novel products, a lack of regional reach, and a lack of opportunity to increase market share. The level and length of environmental hazards that a bank will experience rely on how well-prepared and ready it is to change with the environment. Banks often find it challenging to refocus their business strategies due to abrupt changes in the operational environment, and they face the risk of losing clients and revenue. Losing business over a certain time period in a competitive climate tends to make subsequent years more susceptible since banks will be under pressure to meet ambitious objectives to make up for the deficit. It is essential for efficiently managing operational environment risks to develop medium-term business plans based on research that considers potential changes in the business environment and has a clear emphasis on target markets, target goods, and target customers.

Risk to Reputation

Reputation risk is the possibility that unfavorable publicity about a bank or false perceptions about its soundness and operational integrity would harm the institution's reputation and goodwill. Reputation risk causes the public to lose faith in a company and may sometimes cause a bank to have severe liquidity issues that might lead to the institution's demise. The bank's image suffers when it doesn't keep its promises to the government, regulators, and the general public, but reputation risk shouldn't be mistaken for a risk that only results from not fulfilling obligations. It may result from any circumstance involving poor management of the bank's activities or a breach of the corporate governance norms of conduct. Risks resulting from the omission of information and the falsification of documents and financial records are also included in the reputation risk category. Poor customer service, improper employee conduct, and delays in making decisions damage the bank's reputation and impede the growth of the company. Loss of reputation may also result from a third party's activity, which may be beyond of the bank's control. The management's inability to recognize the incidents that harm the bank's image and to take prompt corrective action may cause the bank's position in the market to decline.

The occurrence of incidents that cast doubt on the management's honesty or the media's publication of certain secret bank transactions or affairs pose a significant harm to the institution's image. For instance, if a financial guarantee granted by the bank to the beneficiary has been invoked, the delay or reluctance to meet obligations immediately raises questions about the bank's intentions to adhere to accepted banking procedures. Such occurrences can result in circumstances where third parties might not accept financial assurances provided by the bank. The grounds that aid in finding the defects that lead to reputation risk are opinions of a bank held by shareholders, customers, and regulators. Market rumors concerning significant frauds that have occurred or significant loans that have defaulted too quickly after receiving funding cast doubt on the management's honesty. Banks are very susceptible to bad press, which might result in a loss of both current and future revenue. Certain loyal clients may be forced to end their association with the bank if its reputation suffers. Despite being of a non-financial character, reputation risk has the ability to harm the bank indirectly.

Lawsuit Risk

Legal risk is the possibility of financial loss brought on by the unpredictability of the results of legal proceedings brought by the bank or by third parties against it in a court of law. Legal risk results from incorrect application, interpretation, or failure to carry out legal responsibilities. Banking transactions contain contracts between the bank and the clients, which may become invalid due to errors in execution or may be contested in court if one of the parties is not authorized to engage in transactions or conversations. Due to incomplete or incorrect paperwork, the agreement may no longer be enforceable. Even unforeseeable events have the power to void a contract. The main factors that result in legal risk are improper or insufficient paperwork as well as flaws in the contracts between the bank and its clients as well as its suppliers.

Additionally, banks run the danger of having their conduct ruled against them in court on the grounds that they violate national or international rules governing banking. For the resolution of their conflicts emerging from ambiguous problems, consumers, third parties, and service providers may bring legal actions against them. Customers may accuse banks of carelessness in how they handle their business or of acting unilaterally in a way that hurts their customers' interests. Cross-border transactions are also subject to legal risk if the

laws that apply there are unknown or ambiguous, or if there are questions about the jurisdiction of one national authority over another [10], [11].

CONCLUSION

In conclusion, the financial sector faces major hurdles as a result of business risk in banking. In order for banks to implement efficient risk management methods, they must have a thorough understanding of the nature, origins, and consequences of these risks. Banks can maintain their financial stability, improve their resilience, and continue to play a crucial role in the economy by proactively recognizing and managing business risks. Due to regulatory changes and the lessons learnt from the previous global financial crisis, there has been an increasing emphasis on risk management within the banking sector in recent years. To improve their risk management skills, banks are investing in cutting-edge risk management technology, data analytics, and stress testing procedures. Furthermore, cooperation is essential for creating a solid risk management culture and advancing financial stability amongst banks, regulators, and industry stakeholders.

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A Brief study on Money Laundering Risk

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ABSTRACT: Money laundering risk poses a significant threat to the integrity of financial systems worldwide, as it enables criminals to conceal the origins of illicitly obtained funds and integrate them into the legitimate economy. This abstract provides an overview of money laundering risk, its underlying factors, and the implications it carries for financial institutions and society. Money laundering risk emerges from the need to legitimize the proceeds of illegal activities, such as drug trafficking, corruption, fraud, and organized crime. It involves a series of processes that disguise the true source, ownership, or destination of illicit funds, making them appear as legitimate assets. These processes typically include placement, layering, and integration, with criminals utilizing sophisticated techniques and complex financial transactions across multiple jurisdictions to obfuscate the money trail.

KEYWORDS: Beneficial Ownership, Compliance, Customer Due Diligence, Financial Intelligence Unit, High-Risk Jurisdictions, Layering.

INTRODUCTION

The bank's inability to adhere to local and international anti-money laundering rules and regulations, including those of foreign nations where the bank has branch offices or associated entities, creates a money laundering risk. Money laundering is the unlawful activity of turning illicit sources of funds into a pool of legitimate revenues that are then used for illicit and criminal activities via a sequence of transactions that seem to be legitimate. Supervisors of the financial sector must overcome a number of obstacles to prevent the employment of financial service providers as middlemen for the deposit or transfer of money obtained illegally via criminal activity. In order to provide the illusion of legitimacy, money launderers often earn cash in their home countries via tax evasion, drug trafficking, illicit weapons sales, and other activities.

They then move those assets to other dummy accounts in overseas locations or invest them in financial instruments. They either conduct criminal and terrorist actions with that money or utilize it for business in foreign locations to make further unlawful revenue under false identities. They use a variety of strategies to conceal the transfer of funds, including selling real estate or other assets to fictitious entities they own in exchange for unpaid debts, remitting funds to cover the cost of goods and services by issuing fictitious invoices, claiming false deductions for payments made to their fictitious entities for rent and depreciation on fictitious machinery and equipment, and depositing checks made out to fictitious entities for fictitious purposes. Similar to how they borrow money from

fictitious parties at offshore centers, money launderers can use deposit receipts of offshore funds as collateral for loans at their place of business or use credit and debit cards issued by offshore banks on their accounts as a way to repatriate money to their preferred locations [1]-[3].

There are no accurate estimates of the amount of money laundering, although it is assumed to be in the billions of dollars. Money laundering is a serious danger to individual financial institutions and the global financial system, and those responsible for it are more likely to be those who operate in tax havens and offshore financial hubs. The inability of the bank to identify money laundering puts its integrity, the amount of cross-border operations, and its reputation at danger.

Due to the likelihood of accidental errors while identifying money laundering operations, compliance with anti-money laundering rules is challenging. First off, there is no clear definition of what financial transactions are deemed money laundering since it is up to each country to decide what constitutes illicit sources of funding and because banks are unable to identify the true origins of the funds. Second, banks struggle to follow bank regulators' instructions to separate transactions with individual values above predetermined limits and screen them for suspicious ones because dishonest clients often split large transactions into smaller ones with individual values below the limit or open and operate multiple accounts under fictitious names to avoid being investigated by bank officials. Even if they may have received training on "Know Your Customer" concepts and the controls are in place to monitor activities in accounts, bank

personnel find it challenging to track money laundering transactions since they deal with high numbers of transactions throughout the day. Third, there is a conflict of interest between the bank's requirement under the Bank Secrecy Act to keep client accounts secret and its commitment under anti-money laundering regulations to disclose transactions containing suspicious activity. Banks run the danger of labeling legitimate transactions as suspicious and, in doing so, breaking the agreement to keep consumer account information private.

In certain nations, the repercussions of banks failing to recognize and report suspicious transactions to the regulatory authorities in accordance with anti-money laundering legislation are particularly severe. If money laundering proof is found, the specific bank workers risk losing their jobs, being found guilty of a crime and being imprisoned. If there is any connection between a bank's operations and money laundering activities, the regulatory authorities may impose heavy financial penalties on the institution itself. Additionally, collateral, personal property, and even clients' legitimate deposit accounts may be forfeited. If bank employees see that clients are attempting to launder money, they should exercise caution when authorizing loans secured by risk-free assets, such as large cash margins or mortgages on real estate, especially if the sources from which the customers obtained the cash or other assets are unclear [4]–[6].

DISCUSSION

Offshore Banking Risk

Banks are exposed to risks from both other counterparties doing business in offshore banking hubs as well as from their own customers that participate in offshore banking. Bank secrecy regulations provide significant protection for financial firms operating in tax havens, which make up the majority of offshore banking hubs. Customers may legitimately need offshore banking accounts due to improved investment options and less taxes, however many customers work with offshore centers to hide money obtained illegally or to hold money for unlawful purposes. Customers don't tell their home country's tax authorities about their financial transactions or revenue from offshore locations. Because there are little or no taxes in tax havens, many clients choose them because their sources of funding are not scrutinized and their account activity is well controlled. The number of operations at offshore banking centers has increased as a result of the

establishment of trusts and subsidiaries by multinational corporations to hold and manage assets in order to lower tax obligations or evade certain taxes. Offshore banking centers offer all types of banking services, including the conversion of local currency into foreign currency. To find tax havens, most agencies use the four criteria listed below:

1. The center grants tax exemptions or levies a small amount of tax.
2. The center provides security against the leakage of private data and transactions.
3. The administrative and legal requirements lack transparency.
4. It is either impossible or ineffective to communicate information with foreign tax and bank regulatory bodies.

Since a sizable amount of assets, estimated to be about \$5 trillion USD, are stored in offshore tax havens, offshore banking has grown significantly in importance within the global financial system. However, it has also turned into a source of danger to the stability of the global economy. Many tax havens have relatively lax financial institution regulation and oversight, which keeps the risk from offshore counterparties secret. Customers create bank accounts at offshore facilities and subsequently withdraw money using debit or credit cards to shift income and escape tax requirements. Because the national authorities may pursue the customers for tax evasion or participation in illegal activities via offshore accounts, banks incur credit risk, money laundering risk, and reputation risk from their clients.

By creating trusts, corporations, subsidiaries, investment companies, or insurance companies under fictitious names, money launderers typically choose offshore banking centers or tax havens to park their illicit funds because the likelihood of money laundering activity being discovered there is very low due to lax anti-money laundering laws and implementation. The laws governing bank secrecy differ by area, and consumers often choose those that provide the best level of privacy protection.

Benefits of Risk

The intensity of various hazards' effects on banks varies. Each major risk category, such as credit, market, and operational risks, has an effect on the bank via a variety of risk variables, and the effect is eventually represented in capital loss, revenue loss, and a reduction in asset values. Risk in banking is the potential loss to a bank as a result of certain occurrences occurring. Risk, which denotes the

possibility of loss, is typically present in financial transactions, however it may also occur in other operational situations. Banks must manage and deal with business risk. The three main company risks that affect profits and asset values are credit, market, and operational risks. The term "control risk" describes the inadequacy or failure of controls to limit the severity of business risk and how this affects the amount of loss brought on by such risks.

Financial and non-financial hazards are two categories of risks. Financial risks include credit, market, and operational risks, while nonfinancial risks include operating environment, reputation, legal, money laundering, technology, strategy, and control risks. Financial risks immediately result in loss, but non-financial risks can result in needless spending and indirect revenue loss. Financial risks' effects are quantified, while nonfinancial risks are classified as low, moderate, high, or very high in terms of severity. Credit risk is the possibility of a counterparty defaulting and the subsequent possible loss. Market risk is the possibility that shifting market factors may result in a fall in asset prices or a deterioration in profitability. Operational risk is the chance of possible loss brought on by unfavorable incidents involving people, internal systems and processes, and external occurrences. Operational risk is assumed in the normal course of business operations, not for an anticipated return.

Changes in the operational environment result in business loss, and reputation risk causes deposit money and business to leave the bank as a result of bad press about the institution. Errors in the implementation or interpretation of rules and regulations as well as failure to fulfill contractual or legal commitments that might include paying claims based on court orders constitute legal risk. Violations of anti-money laundering laws and regulations that might lead to a criminal conviction and the payment of a fine provide a money laundering risk.

Banking Risk Management

Because of the shortcomings in their control framework and the potential for human error while applying control, banks are vulnerable to control risk. Lack of product and business process understanding may contribute to human failure. Control risk develops as a result of carelessness in the implementation of controls or as a result of cooperation and compromise with the guiding principles and regulations of the company. Controls are preplanned checks that stop mistakes, slipups, and excesses from happening while

the bank does business. However, risks may also arise from unforeseen and unplanned situations for which the control structure may not always be enough. Because certain kinds of occurrences are uncommon, it may not be able to envision every potential risk scenario and then put up a complex management system to handle each risk event. As long as there is continued concern about such risks, control managers must be able to identify the threats and put up a temporary monitoring system. More significant than the complexity and finesse of the control methods are the awareness and sincerity of those who are in charge of applying control. A bank must consequently have an impenetrable control system due to the substantial effect of control risk [5]–[7].

Risks Related to Internal and External Control

External and internal controls are two different kinds of controls that banks must abide by. The financial sector authorities exercise external control, while the bank's management exercises internal control. External control aims to lessen vulnerability and advance the financial system's soundness and stability. The protection of depositors' and small investors' interests as well as ensuring the stability and solvency of each bank are the main duties of the bank supervisor. Through the banking and financial services regulatory acts, the supervisor exerts supervision over banks and other financial institutions in order to achieve this goal. The broad categories of external control include enough capital, management quality, operational policies, risk management techniques and processes, asset categorization and provisioning, accounting quality, transparency, and disclosure.

Inadequate regulatory and supervisory controls and internal noncompliance with regulatory and supervisory requirements are the two main sources of external control risk for banks. The bank management may become complacent regarding the soundness of operations due to regulatory and supervisory supervision gaps. A lax regulatory framework and a protracted lack of supervision encourage banks to engage in economic or financial operations that are riskier than they can handle. The bank's asset quality will eventually decline, defaults will increase, losses will show up, and eventually the bank will become insolvent. The 1990s financial crisis in Asia and the 2007 financial crisis in the United States are examples of this tendency.

On the other hand, if the bank doesn't follow the supervisory instructions, fines may be imposed or discriminating action may be taken against it. For

instance, the bank may experience discriminatory action such as an increase in the capital adequacy ratio, a halt to branch office expansion, the elimination of unprofitable activities, a cap on dividend payouts, the reconstitution of the board of directors, and so forth if it is unable to meet the milestone established under the supervisor's prompt corrective action framework. The operations and expansion of the bank are impacted by these supervisory and regulatory activities, although gradually. On the other hand, a lack of internal control has a quicker and more significant effect on the bank. Internal control, which is management-driven, is intended to keep an eye on company dealings, operational operations, and employee performance. It safeguards the integrity of operational processes and verifies how actions are justified. Internal control procedures that aren't strictly followed increase company risks and lead to significant financial losses, which are often paid for out of the current year's earnings. Weak control lowers the bank's profitability and lowers the equity's market value. The internal control framework in banks works to lessen the effects of residual risks such as credit, market, and operational risks. It is a component of the overall risk management system. Honesty in the use of control is necessary to keep risks in check and avoid financial calamities. A bank's long-term financial solvency is safeguarded by effective internal control systems, making management's sincerity in upholding the integrity of control essential for managing risks.

Control Internal Objectives

Internal control is a procedure that aims to increase operational effectiveness, the accuracy of reporting, and rule compliance as well as to support the soundness of the bank's business practices and its capacity to remain solvent financially. It affects employees at all organizational levels and is a constant process. Internal control's main goal is to guarantee that the operational staff complies with the bank's rules, policies, and procedures while also minimizing and containing risks. The goal is to keep an eye on the amount of risk in proportion to the bank's appetite for risk, ensuring that business is done within agreed-upon risk parameters, and reduce the chance of asset loss or revenue loss. As a result, the most important component of the control process is compliance. The purpose of the internal control procedures is to ensure that the bank complies with all relevant laws and the norms and regulations outlined in the Banking Regulation Act.

Evaluation of the operational staff's performance effectiveness in achieving company goals, making optimal use of resources, and cutting costs is another goal of internal control. The goal also entails reporting and reviewing all company transactions and operations, as well as ensuring that all goods and services are compatible and that all linked units are functioning properly to take prompt corrective action. Internal controls are put in place to keep the bank on its intended path toward achieving its objectives and, in the process, reduce potential roadblocks and unexpected consequences. The efficacy depends on how seriously the control procedure is applied as and when transactions are completed or tasks are completed. Control risk is a high-risk element because the internal control mechanisms are weak. Due to internal control failures or insufficient control implementation, several banks across various nations have incurred substantial losses or gone bankrupt.

A Framework for Internal Control

The Control Framework's personalization

Because various banks engage in different kinds of financial operations and use different products, it is difficult to imagine the perfect architecture of an internal control system. The majority of banks carry out standard banking activities like lending money, buying securities, issuing guarantees and letters of credit, and trading in foreign exchange and derivative products. However, some banks focus on investment banking and merchant banking or lending money for residential and commercial real estate. Financial conglomerates have several banking divisions that provide various banking services, a securities division that deals with corporate bonds, stocks, and sovereign securities, and an insurance division that offers life insurance and other insurance services. Trading in derivative goods is comparatively more difficult and extremely speculative than trading in stocks, foreign currency, gold, or commodities. As a result, there cannot be a predetermined design of the internal control system based on a "one design suits all" philosophy. The design should be in accordance with the operations and activities of the bank and adapt to its unique needs. The control need to be transaction- and activity-specific. The control system should be designed to cover all company operations, the whole spectrum of goods and services, and all places where the bank does business, either directly or via connected entities.

In line with internal control goals, a bank's control framework should be designed with methods and steps

for the three main types of control: control over performance, control over reporting, and control over compliance. The framework should first contain a technique for assessing performance across business lines or activities at various times in time. To determine if employees inside the company are acting honestly and morally in order to accomplish organizational goals with operational efficiency, the framework must provide criteria and standards. Second, the control framework should incorporate activity- and transaction-based reporting formats to provide all information and statistics on the operations carried out by the operational staff within a predetermined time limit to the monitoring and review personnel. The control system should contain provisions for periodic reporting by the various business line heads on the assigned budgets, performance, and other significant events in addition to transaction and customer data. Third, the control structure should assess how well and thoroughly compliance is being followed, and it should keep track of how well transactions, activities, and products are being handled and supplied in line with established policies and procedures. To make sure that the company is conducted in line with internal rules, regulatory directives, and relevant laws, the framework should include an integrated surveillance system. Control procedures should be set up such that they quickly spot and report violations of policies and procedures as well as other operational abnormalities. The process for establishing accountability should be included in the framework.

The internal control framework's architecture is determined by the firm's volume, size, operations, business strategy, product variety, and complexity. The design is also influenced by the scope and degree of control that the bank management wishes to exercise in each operational area. Regarding material operations that involve a high level of risk and the potential for significant losses, strict control is required. The control structure will be extensive if the bank operates throughout a large geographic area and has a number of connected businesses that provide a variety of financial services, including real estate lending, securities trading, and insurance. The functional head who will be in charge of controlling operations should be identified in the design. Business leaders and line managers are also in charge of keeping an eye on and in charge of their respective areas' actions in addition to the internal audit department [6]–[8].

Control Methods

The main purpose of controls is to identify abnormalities in transaction bookings, deviations from policies, exceeding approved limitations, and unauthorized exceptions. Control actions start when relations with a client are established and conclude when that connection is closed. Occasionally, control operations go on even after a client connection has ended. For instance, banks continue to follow the activities of a client whose loan account has been written off due to company failure and lack of revenue in order to confirm that the claims the customer made in order to waive the repayment were accurate and that there were no actual possibilities for future recovery. The risks and hazards to which the bank is exposed must first be objectively assessed, after which different sorts of control operations must be implemented. Each control measure must be connected to an outcome it is intended to accomplish. For instance, if the goal is to assess the effectiveness of a business line head's performance, control is exercised through a review of the business report from the head of the business line, which details achieved business targets, emerging risks from the business line, threats, and steps taken to control risks and address upcoming challenges. Pretransaction, posttransaction, preventative, detective, and corrective controls should all be included in the control structure.

The preventative and investigative controls pertaining to electronic banking are not covered in the next section, which lists several sorts of controls that a bank should have. For this reason, banks should implement laser-printed checks, secure Internet banking log-in and log-off procedures, appropriate systems and checks for the use of debit, credit, and smart cards, as well as automatic linking with customer accounts, and mobile banking authorization procedures. They should also put in place the most up-to-date tools for counting cash, identifying counterfeit money, and forging checks. The next part discusses larger types of control that are intended to handle prudential obligations, steer the bank's activities in a safer direction, and adhere to corporate governance principles.

Controls Before Transactions

To guarantee that transactions are recorded on their merits and in line with banking practices and banking laws, the bank must establish business standards, rules, and processes known as pretransaction controls. The controls should accomplish two goals. In order to guarantee the quality of an asset and the rationale for taking on a responsibility, the proper due diligence

procedure must first be undertaken. Second, the transaction complies with the bank regulator's instructions and all relevant laws.

Controls After Transactions

Post-transaction controls are the regulations and practices that must be established to guarantee proper fund utilization, watch over and safeguard asset quality, check the legitimacy, terms, and conditions of transactions, take timely corrective action, and limit financial losses should risks ultimately materialize.

Preventive Measures

The rules and processes that must be developed to prevent mistakes and fraud as well as to look for procedure eluding and neglect of tasks and obligations are known as preventive controls. In order to avoid manipulation of account books, check for the loss of cash and other valuables, and prevent illegal access to the bank's computer system, vaults, and storerooms, preventive measures are put in place. Preventive measures also include actions intended to deter thefts, break-ins, and looting as well as efforts to do malevolent acts against the bank that will result in loss.

Investigation and Corrective Measures

Controls over reporting, screening, and reviews of the bank's activities in many areas are governed by detective and remedial controls. These controls are used largely to find unlawful transactions, mistakes, fraud, omissions of crucial financial reporting information, and other issues that have cost the bank money in the past or have the potential to do so in the future. The asset-liability position, which has the potential to produce a variety of market risks, is one activity that is periodically reviewed as part of the investigative and corrective controls.

to provide regular updates on associated party loans to the in charge.

1. To evaluate the volume and quality of lending to connected parties.
2. Giving loans to associated parties without doing proper due diligence and making compromises in terms and conditions.
3. Must provide the governing authority with a summary of loans approved using the discretionary financial powers at certain intervals. to spot the abuse of discretionary authority for one's own gain.
4. To report the ratings given to borrowers based on the internal model to the appropriate authorities. to identify rating mistakes and the assignment of biased or motivated evaluations.

To provide the relevant internal audit results to the authorized authority, in particular those that deal with inadequate systems and control, procedural violations, and abnormalities in transaction bookings. to upgrade systems and practices to stop anomalies from happening again in the future, take disciplinary action, implement new kinds of controls, or strengthen current controls [6]–[8] [9]–[11].

To provide reports on the findings of internal back-testing of counterparty ratings and risk assessment models. to update and alter models to better reflect real-world circumstances. detailing the costs expended under discretionary authorization for maintaining office space, and to send this information to the appropriate authorities on a monthly basis. to confirm the accuracy of the work completed and the appropriateness of the costs.

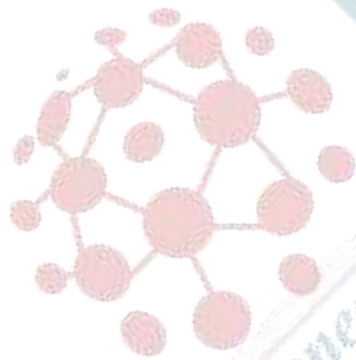
CONCLUSION

In conclusion, the possibility of money laundering is a serious concern for both society at large and the global financial system. Financial institutions and other stakeholders must comprehend its fundamental causes, effects, and practical mitigating measures. The battle against money laundering may be stepped up, preserving the integrity of financial institutions and promoting cooperation while using technology improvements. This will also help to create a safer and more open global economy. Financial institutions, authorities, law enforcement, and international collaboration must work together to address the danger of money laundering. To successfully address this worldwide danger, improved information sharing, coordination, and harmonization of AML rules across countries are essential. A strong anti-money laundering system must also include strengthening legislative frameworks, raising awareness, and fostering a culture of compliance.

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Tasks in Establishing a Control Framework

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ABSTRACT: Establishing a control framework is a critical process for organizations to ensure effective governance, risk management, and compliance. This abstract provides an overview of the key tasks involved in establishing a control framework, highlighting their importance and the benefits they offer to organizations. The establishment of a control framework involves several essential tasks that enable organizations to identify, assess, and manage risks, as well as establish appropriate controls to mitigate those risks. The first task is to conduct a comprehensive risk assessment, which involves identifying potential risks and their potential impact on the organization's objectives. This step helps prioritize areas of focus and determine the necessary controls.

KEYWORDS: Control testing, Documentation, Gap analysis, Identifying control deficiencies, Monitoring controls, Policies and procedures.

INTRODUCTION

The control framework's design is influenced by the workplace environment of a business. In addition to the standards of conduct, each company has its own work culture and standard operating procedures. It is easy to determine if workers are safety-conscious and considerably rule-abiding in their interactions, or whether they are unconcerned about the company and its future, based on the work culture and their attitudes about the organization and its management. Employees in many businesses believe that management should be the only ones allowed to think about the organization's future and that they have no part to play in it. This hypothetical situation provides clues as to how stringent the control mechanism has to be. The management's dedication to upholding the sanctity of control, their seriousness in taking a position on the violation of rules and procedures, and their sincerity in upholding impartiality and transparency of punitive measures for rule violations all speak to the friendliness of the workplace environment. The management's governing ideology, operational style, and care for the workforce are all parts of the environment [1]–[3].

Delegated financial and administrative authorities' scope and materiality are crucial aspects of the work environment in banks. The creators of a control framework should be aware of the organizational climate and provide a structure that will safeguard the control's guiding principles and objectives. The framework should include components that encourage high standards of ethics and integrity in the fulfillment of tasks and instill a feeling of belonging in the

employees in addition to features that limit and mitigate business risks. The goal of developing a network of controls is to strengthen the control culture already present within the business and to raise control awareness among management and staff.

Tools and Techniques for Risk Assessment: A Review

The risk profile and the bank's risk appetite should be considered while designing the control architecture. Control is a reaction to risk events that are anticipated to occur across the bank's business operations. To ascertain what kinds of controls are essential to make sure that the systems and processes are reliable and functioning effectively, it is vital to examine the risk assessment methodology and the tools and methods chosen by the bank to identify, capture, and measure enterprise-wide risk. All of the hazards that a bank faces should be included in the risk identification process, which is a component of the control system. If the underassessed or unrecognized dangers unexpectedly materialize, failing to adequately evaluate risk or failing to detect risk might have disastrous financial repercussions. The control architecture should include methods to identify failures to identify risks from all sources, evaluate their significance, and predict their potential effects. The risk aggregation desk should receive information from the control process on the kind and quantity of risk associated with business agreements made with customers. The potential loss stays concealed if the control system is unable to recognize and disclose risks in certain transactions or activities. As a result,

the bank must periodically assess the internal control procedure to identify any shortcomings.

Because there are sometimes several hazards that arise from a single transaction, it may be challenging to identify and collect all the risks for risk aggregation. When a bank purchases corporate bonds in local currency, for instance, it is exposed to at least four different categories of risk. The first is interest rate risk, which might reduce the bonds' market value, and the second is credit risk, which could result in the principal not being repaid when the bonds are due for payment. The counterparty's inability to pay periodic interest due on the bonds might result in the third component, the profits risk. The stream of bond payments due during the nondefault state will stop being received in the case of default, resulting in a liquidity gap the size of the amount due. This is the fourth factor. Therefore, all four components of risk should be incorporated in the control process for this single transaction in order to include an appropriate reaction in the control structure for each of these uncertainties.

The operational environment for banks is impacted by the ongoing changes in macroeconomic and microeconomic aspects in an economy. An ideal control architecture would warn the bank in advance of any risks brought on by outside forces. The control technique should determine the several risk categories that might come from anticipated changes in economic-related variables and evaluate the effect on the bank. The evaluation procedure should determine which risks are manageable and which are more challenging. This will make it easier for businesses to grow in comparatively safer locations while decreasing or stopping operations in places where risk levels are projected to rise.

The risk measuring process should be covered by the control framework in addition to risk identification methods. The risk rating given to the borrowers and the accuracy of the data used to calculate anticipated and unexpected losses are crucial factors that affect the credit risk measuring procedure. For determining capital adequacy and distributing capital, the accuracy of the data and information used to calculate market risk and operational risk is equally essential. The processes to verify the veracity of data, information, and assumptions as and when they are supplied into the computer system must be specified in the control framework.

Banks must do a cost-benefit analysis of the control activity before establishing the control framework. The control structure includes the branch office

managers, regional office heads, and other operational staff submitting returns and statements. The cost of gathering the data and information, analyzing it, carefully examining it, and devoting time to potential actions is fairly significant. As part of the control responsibilities, banks often request a high volume of returns and statements from the field offices at various periods. However, a large number of these returns and statements are unnecessary and unimportant. Therefore, it is advantageous to create an ideal control structure that eliminates those aspects of control that provide marginal advantages. The bank must consider the expenses associated with maintaining various streams of controls and evaluate their value [4]–[6].

DISCUSSION

Determining the Control Application Field

In financial organizations, there is a wide range of control applications. A strong corporate governance system requires that the control structure at the very least cover those areas that are crucial. The following are crucial areas where controls are required:

1. Approvals, Authorizations, Verifications.
2. reconciliation and accounting.
3. protection and custody of goods, treasures, and records. business-related pursuits.
4. actions of employees. monetary reporting.
5. separation of responsibilities and tasks.
6. Finding Controlling Elements

The series of steps required to contain, minimize, or prevent hazards is referred to as control. The control structure consists of three control layers and three control application phases. Policies, plans, and restrictions, as well as business-related rules and processes, make up the primary layer of control. These include benchmarks and guidelines that help to control the risks involved in transactions and portfolios. The reporting formats and returns that monitor compliance and quickly identify the assumption of risks that are not consistent with the bank's risk appetite and risk management philosophies make up the second layer of control. The goal is to warn field authorities and business line leaders when they try to circumvent established rules and procedures as well as when they are likely to approach or surpass the risk limits. The mechanism for processing and examining data and information provided in periodic returns or sent to higher authorities via a computer network system makes up the third tier of control. In addition to identifying negative characteristics that are emerging in various areas of the bank's operations, the goal is to uncover violations of established limitations and

deviations from processes so that preventative measures may be taken.

Once the control parameters have been configured, it is required to implement the control in the proper order. The method for executing transactions is verified in the first step of the control application process. The goal is to confirm that the authorities followed the guidelines for due diligence and adhered to the established guidelines and processes. The second step involves the operational staff's review of the reporting information from the perspectives of correctness and thoroughness. The goal is to prevent information manipulation and the purposeful concealment of illicit transactions while preserving integrity and honesty in reporting. The thorough examination of procedural errors, violations of the regulations, and unlawful acts is the third step. The goal is to immediately take remedial measures to safeguard company interests while also starting legal proceedings to punish offenders.

Since the goal of a good verification process is to verify conformity with rules and regulations, it is essential to the control system. In addition to external auditor verification, banks must establish an unbiased and independent internal audit role to uphold the integrity of the verification process. The creation of detailed plans for responsibility distribution and task distribution among personnel is another part of the internal control structure that aims to prevent conflicts of interest between the operational function and the reporting and control function. If it seems that there is room for the manipulation of transactions and data, or the concealing of unlawful acts, the sphere of action in this respect is to identify the susceptible and sensitive areas of operation and divide the tasks between more than one person [7]–[9].

Building a Stronger Control Foundation

i. Improved Communication Effectiveness

The fundamental conditions for the control system's effective operation are information acquisition and transmission. The bank must set up a two-way communication system so that messages can be sent to the field employees and received in return, along with ideas and information from them. Since improper and illegal communication might lead to issues, there needs to be the proper controls in place. Determine the sort of data and information needed in various operational areas to exercise control, the frequency at which the data and information are needed, and other factors in order to build an effective communication system inside the business.

what techniques should be used to successfully convey them to the staff members inside the firm. Identification, collection, and transmission of suitable and pertinent data and information to the monitoring and control people in a structured manner are crucial. Top management should provide a clear message to employees about their control obligations and the potential administrative consequences of neglect and duty-related misconduct. The operational and field staff should also be authorized to advise the appropriate organizational authorities of crucial information and negative events. Control over communication with outside parties is just as crucial as internal communication. External communication is riskier since it spreads more quickly and is more likely to be unwelcome or wrong. The communication with customers, shareholders, the government, and the financial regulatory body will be suitable and accurate thanks to a mechanism built into the control foundation.

ii. Improvement of the Control Culture

Strengthening the control foundation of an organization requires improving the control culture and awareness. There are connections between the various controls' components that apply to various tasks and activities. The operations that are within the purview of a business line head's management are not the only ones that fall under that purview. The operations related to several business lines have connections and overlap. If the staff are unfamiliar with the connections between various business lines and the pertinent parts of control that apply across business lines, the foundation of control will be weak.

iii. Increasing the management information system's capacity

The core of the control foundation and necessary for the efficient operation of the internal control system is a complex and sophisticated management information system. Since activities and outputs vary amongst institutions, the MIS is institution-specific. The MIS should record all pertinent information about the bank's operations, clients, and transactions, including details about outside events, monetary variables, and market circumstances. To make exercising control easier, the MIS should generate data and information in organized forms. The system should keep, process, and provide information and data in the forms required by the operational staff, business line managers, and senior management. Both electronic and non-electronic approaches are used to send communications produced by MIS. To avoid data

tampering and message corruption throughout the data input and data transmission phases, appropriate checks and balances will need to be implemented at various levels of the organization.

Relationship Between Business Risk and Risk Control

Business risk and control risk combine to form a bank's overall risk profile; there is no link between the two; rather, they operate independently of one another. The bank may improve its internal control in order to reduce business risks if they increase in scope. Control risk will decrease in such a scenario, but business risk would stay high. If the company risk level stays the same, weak controls imply a larger internal control risk, and the higher the control risk, the higher the total risk level will be. If the field staff is slack in the application of internal control, the real losses from credit, market, and operational risks will be larger than the prospective losses calculated under risk assessment models. Weak internal control might potentially raise the bank's financial loss, other factors being equal.

Different people have different views on the relative importance of business risk compared to control risk and which risk should be given more weight when determining a bank's overall risk profile. This mostly relies on the company profile, and managing risk is more important for a bank that engages in a lot of speculative trading or transactions. A bank that engages in high-risk activities will have fewer worries if it has an efficient control system to manage the risk. However, for banks that engage in traditional banking activities, where loans and investments make up the majority of assets, business risk is more significant because these organizations typically have a standardized control system. Since the quality of control is more crucial in reducing the business risk, it is often fair to give control risk a higher priority.

Controls are reactions to risk events that arise in a bank's operations and are made up of a series of steps meant to limit, mitigate, or eliminate risks. The insufficiency of the control structure and the potential for human error in the implementation of control create control risk. The amount and scope of company risk rises as a result of weak internal control. Because supervisory and regulatory shortcomings in the exercise of control may not highlight the vulnerability in their operations and may eventually result in bankruptcy, banks are susceptible to external control risk. Similar to this, weak internal control frameworks

and loose implementation of control might result in significant losses for banks.

In a bank, the main goals of internal control are to reduce and contain risks and to make sure that the operating personnel complies with the established policies, procedures, and restrictions. The serious implementation of the control method is essential for internal control to function effectively. Because banks' business operations and risk profiles vary, so do their internal control designs. The three key parts of the internal control structure are control over performance, control over reporting, and control over compliance. Controls look for abnormalities in the way transactions are recorded, departures from protocol, and exceptions that are taken without justification or consent. Control actions start when a connection with a consumer is established and continue until that relationship is closed.

Before structuring the design of the controls, banks should conduct an objective evaluation of the risks and dangers to which they are exposed, examine the workplace, and determine the range of activities that should be under control. Pretransaction, posttransaction, preventative, detective, and corrective controls should all be included in the framework. By implementing an effective communication system, a thorough management information system, and establishing the control culture among the employees at all levels, the fundamental basis of the control structure may be strengthened.

Banking Technology Risk

Risk of Technology

The daily usage of computer systems for the bank's operations, the reconciliation of its books of accounts, and the storing and retrieving of data and reports all introduce technology risk. The danger might arise from the implementation of unproven or outdated technology as well as the selection of flawed or unsui technologies. Security lapses for computer system access, system manipulation, and unauthorized usage present a significant danger. Information technology has always been employed as a supporting tool for the quick and precise delivery of financial services. The usage of information technology in financial services have significantly expanded over time. Due to fierce rivalry, banks had to expand their network of financial services and goods, as well as provide services remotely and let consumers use the computers from their own end. Rapid developments in the technology framework underlying financial services expose banks to new challenges.

Electronic Banking Risks

Information technology risk has multiplied with the emergence of Internet banking, mobile banking, automated teller machines, and other utility services. Banks have been forced to make adjustments to their products and speed up service delivery as a result of the necessity to provide several electronic banking services. Banks have little time to adapt to changing technical needs due to market competitiveness. Their risk profile has expanded with the development of electronic channels for off-site service delivery. The frequent modifications to computer systems and increased reliance on vendors for system design and maintenance make electronic banking services highly technologically risky.

In order to provide its clients with Internet access, banks must set up two websites: one for public dissemination of information on goods and services, and the other for customer use in doing business directly with the bank. The PR website has to be updated on a regular basis with information on services, including the launch of new goods and services, standard interest rates for loans and deposits, currency rates, equity prices, and details of unique programs and facilities. Customers may do their banking transactions off-site using the functional website. Customers may use this website to transfer money, pay bills, check their account balances, pay third parties, and conduct online trading in stocks and other financial instruments. Therefore, the usage of the network system by clients poses a significant danger to banks.

Technology risk has significantly grown as a result of the availability of electronic money transactions via the use of debit cards, smart cards, and credit cards. The danger of preserving values on both an individual card basis and a network basis exists for banks. The security and management of the network system are in danger because of this challenging job. Additionally, the ability to move money across a network system and the usage of electronic cards carry the potential of money laundering by dishonest clients, which banks will find very difficult to catch. Therefore, by its very nature, electronic banking involves two critical issues: how to set up a security system that is impenetrable, and how to assure that the bank has access to legal protection under the applicable laws. The security system's weakness and the lack of legal protection might cause banks to suffer significant losses.

Technology Risk Sources

Information technology adds additional dimensions to existing risk categories rather than creating new ones. The following are the main industries under danger from technology:

- i. Goods, procedures, services, and delivery methods based on technology. Data gathering, processing, storing, and retrieval.
- ii. dependability and maintenance of computer systems.
- iii. Vendors are another source of technology dangers.
- iv. Systems hardware locations. software development.
- v. Compatibility of systems
- vi. Planning and designing a system
- vii. Systems management.

Selection of Vendors

The suppliers from whom the technological systems are purchased are the source of technology risk. Due to a lack of internal resources and the need for ongoing system updates, the majority of banks outsource their information technology needs. When a bank leaves the whole task of building and developing the technical systems to an outside firm, the risk associated with technology grows significantly. Information and statistics may be produced that are insufficient and inaccurate due to deficiencies in system design, errors in system implementation, and carelessness in equipment maintenance. In a time of rapid technological advancement, purchased equipment quickly becomes outdated, and purchasing new systems comes with a number of hazards in addition to the upfront expense. The danger is increased by the internal staff's inability to quickly adopt new technology. A possible cause of high risk is the inability of the suppliers to provide services in a timely manner when the technical system has issues.

Systems Hardware Location

For risk management and risk control, large banks need data storage, processing, and retrieval facilities at several locations. The hardware system has to be accessible from every location of operation and situated in a highly secure area. The installation of large-capacity equipment, such as the primary server, must be done at a position that can withstand unexpected and almost uncontrollable dangers. Greater dangers exist in areas that are vulnerable to riots, law and order disruptions, earthquakes, floods,

storms, and areas where the legal environment regulating electronic banking and trade is unclear.

Software Development

Banking institutions' software systems are prone to programming errors. Additionally, there may be discrepancies between various programs used in various operational domains. The collection of software tools that banks purchase should be coherent. Mechanisms that may prevent efforts to corrupt or manipulate the systems should be included in the applications. Errors in the use of programs may occur as a result of staff members' unfamiliarity with the programs and ignorance of the applications of these programs. When an existing software system is modified or altered, there is a chance that the system will be manipulated, which might make it easier for fraud to be committed later. As the system's dependability is established with a minimal amount of testing, there may be a larger chance of mistake during the postmodification period. Interruptions or virus infections may occur as a result of an unanticipated incident, either internal or external, which might harm computer systems and result in the loss of revenue, assets, and reputation. If the program application is interrupted while there is a likely and frequent client contact, such as when using an ATM or an Internet banking facility, the situation will be catastrophic. The risk associated with program application also stems from the potential for unintentional or accidental exposure of sensitive customer information or bank business information to other parties, which might result in fraud, legal issues, and reputational damage.

Compatibility of Systems

The government, the regulator, the public, other banks, and the legal community are all stakeholders in the way that banks function. If a bank's information technology setup does not adhere to the established standards and specifications and does not satisfy legal criteria, the government and regulator may take punitive action. Additionally, if a bank's systems are incompatible with those of other banks, it may have technical issues. For instance, the operating platforms within the financial industry must be compatible with built-in mistake correction and risk protection systems in order to participate in the payment and settlement system. If the system falls short of consumers' expectations and peer banks' convenience, there might be a loss of revenue. If clients question the validity of certain electronic transactions that were recorded in the system, there may be legal implications. If the bank is not given enough legal protection during such

conflicts, money may be lost. Changes in legislation and regulations governing information technology will have a stronger effect on banks with higher levels of automation.

Planning and Design for Systems

In addition to financial loss, flaws in the planning and design of technical systems may often result in operational issues. A bank is involved in many different kinds of financial activity, including core banking, insurance, dealing in securities, merchant banking, and consulting. It provides a variety of goods and services. Appropriate systems are needed to conduct transactions and provide fast service in order for the company to run smoothly throughout its many hubs. If planned company expansion and business diversification are to be accomplished in line with the corporate aim, systems support is essential. The bank needs an information technology plan that is acceptable and in line with its business strategy. Information technology strategies and plans should support speedier transaction processing and decision-making, help businesses take advantage of commercial possibilities, and provide banks an edge over their rivals in terms of competitiveness. The planning and strategy should guarantee that the bank's technology package is comprehensive in every way. Risks are increased by the frequent modification of technological systems and piecemeal equipment purchasing. The plan should contain contingency plans, provisions for alternatives, choices for carrying on business in the event of disruptions due to technology errors, and the technical assistance required to manage and mitigate risks in the business environment.

The medium-term company aim should be taken into consideration in the planning and strategy for information technology. The system should be able to handle future business requirements in addition to meeting current business demands. Since purchasing and maintaining technological systems is costly, banks should avoid generating excess capacity in their computer hardware and software systems. They ought to implement a sensible business plan to maximize organizational technical potential and reduce transaction expenses.

Systems Management

The selection of employees for positions in information technology is risky since those without the necessary training and experience could not know how to manage computers and maintain their integrity. The bank must make sure that the staff's training and

experience correspond to the appropriate degree of technical competence before assigning them to the information technology department. This necessitates the employment of technically competent employees who have received the proper information technology training in key locations. The personnel may abuse the systems, and the software applications may be used for a variety of purposes. As a result, the right checks and balances need to be in place to guarantee that the system is free from anomaly. To prevent conflicts of interest, there should be a distinct separation of roles and responsibilities between the technical personnel and the operational employees. The same individual shouldn't be in charge of both running the firm and controlling it. The assignment of duties should eliminate any chance of system abuse and any opportunity for data manipulation or tampering. It is best to maintain a separation between the employees in charge of developing and altering the hardware and software systems, as well as performing routine maintenance [10]–[12].

Risk Management in Technology

The sources from which technology risk may arise cannot be foreseen in advance so that adequate controls can be put in place, making it difficult to manage risks from a bank's information technology setup. If there is a large reliance on an outside organization for system supply and maintenance, the risk is high. The bank should be aware of the potential sources of technological risk and make sure that the purchased system is secure against such threats. Additionally, the bank must carry out the following tasks to control technological risks:

- i. Installation of impenetrable security measures to guard against unauthorized access to the computer system.
- ii. Monitoring how clients are using the network system. the creation of a backup plan in case of network or system failure.
- iii. Creating a strategy for catastrophe recovery. putting together a business continuity strategy.

monitoring adherence to laws and norms regulating electronic banking and information technologies. Information technology adds additional dimensions to existing risk categories rather than creating new ones. The usage of computer networks for company operations and the development of electronic channels for offering consumers off-site services expose banks to technological risk. A key source of technological risk is the security system's weakness in preventing unauthorized computer usage.

Technology risk has grown dramatically over time as a result of the advent of automated teller machines, mobile banking, and other utility services, as well as Internet banking, automated mobile banking, and other facilities for electronic money transactions. Additionally, the usage of electronic cards in transaction execution has raised the possibility of money laundering.

Technology hazards may be created by vendor choices, hardware system locations, software program designs, and software application domains. High technology risk occurs when technological systems are improperly planned and designed and when employees are placed there without the necessary training and exposure.

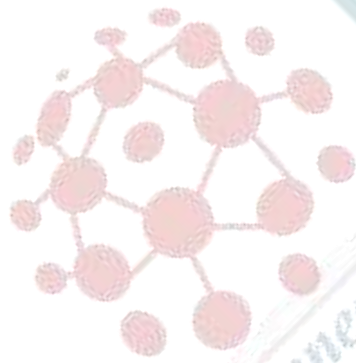
CONCLUSION

In conclusion, for companies looking to guarantee effective governance, risk management, and compliance, creating a control framework is a crucial task. A crucial component of the control framework's overall efficacy and success is the essential tasks involved, which include risk assessment, setting control goals, developing and executing control activities, creating documentation and communication systems, and continual monitoring and evaluation. Organizations may improve operational efficiency, boost risk management skills, and reduce possible risks and compliance concerns by devoting time and effort to building a strong control structure.

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Fundamentals of Risk Management

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ABSTRACT: Risk management is a fundamental practice that enables organizations to identify, assess, and mitigate potential risks that could impact their objectives. This abstract provides an overview of the fundamentals of risk management, highlighting its key components, processes, and benefits for organizations. The fundamentals of risk management encompass several key components. The first component is risk identification, which involves systematically identifying potential risks that could affect an organization's ability to achieve its objectives. Risk assessment is the next component, wherein the identified risks are analyzed to determine their potential impact and likelihood of occurrence. This assessment helps prioritize risks based on their significance and informs subsequent risk mitigation efforts.

KEYWORDS: Enterprise Risk Management, Event Identification, Loss Prevention, Mitigation Strategies, Probability, Residual Risk.

INTRODUCTION

Risk management primarily entails identifying hazards that emerge over the course of the bank's operations and effectively addressing them to reduce or eliminate potential losses. It is a process that includes creating tools and strategies to recognize and evaluate risks as well as setting up policies and procedures to handle them. In addition to setting financial restrictions and benchmark requirements for various activity kinds, it also entails the design of policies and plans. The goal of risk management is to maximize risk-adjusted returns on assets via a sequence of business choices based on sensible company policies and strategies. Instead of avoiding risks, the goal is to manage them and lessen their effects by using the best available alternatives, such as accepting and managing risks, hedging against them, or transferring them [1]–[3].

Although the key activities of the process are the creation of tools and procedures and the implementation of limits and controls, management attitude and staff ethics are crucial for obtaining the full advantages of risk management. The staff should become knowledgeable about the risks and take part in handling and controlling the risks. The bank management must create high standards for managing risks and identify the limitations and boundaries of accept risk levels. As a result, management has to commit adequate funds to building internal risk management capacity.

Arrangement for Risk Management

Banks engage in a variety of operations, making it impossible to manage risks at the level of each activity

or inside functional silos. As a result, a holistic strategy is necessary to address risks. distinct hazards have distinct characteristics, including their level of severity and frequency of occurrence. The risk events are interrelated and concurrently impact several operational areas. With some degree of precision, credit, market, and operational risks can be evaluated, but nonfinancial risks including business environment, reputation, legal, technological, and control risks cannot. at addition to operational risk, committing a significant fraud at a bank also entails legal and reputational risk. Therefore, it is improper to handle various risk kinds separately by confining them in watertight compartments. Because each banking activity produces several types of risk, an integrated approach to risk management is important. All risks from each activity, each transaction, and each product must be identified and dealt with. Risk management aids in the selection of activities that have better returns in addition to minimizing the effect of hazards. An integrated approach to risk management allows management and workers to comprehend the variety of risks, the sources from which they may arise, and the methods by which they may be addressed. This approach assists in striking an ideal balance between risk and return at the corporate level.

An enterprise-wide risk assessment is part of an integrated approach to risk management. In order to get a comprehensive view of the whole risk profile, the bank must first evaluate the risks from each operational site, including linked businesses, and then calculate the total of risks arising from all operations and products. The ability to make well-informed decisions is facilitated by enterprise-wide risk assessment. It also exposes the relative importance of

the many risks the bank confronts and determines the degree of alteration in risk management tools and procedures required to address the new circumstance. Some banks are run by a sizable holding company that has a number of related subsidiaries operating in many nations. The holding firm conducts banking, securities, and insurance activities and acts as a universal banker. In these situations, it is vital to evaluate the holding company or conglomerate as a whole in terms of risks. The parent firm, which is responsible for saving the affiliated units by providing them with financial and other help when they are in need, operates under the brand name of the affiliated units. Similar to the previous example, even though it may not be legally required of it, a bank has an obligation to help its subsidiary units that deal with mutual funds or provide insurance services if they are unable to pay their debts. This is as a result of the fact that its brand name was used to establish the subsidiary divisions, and people kept their money there because they trusted the bank's reputation and financial stability. Since the units are different legal entities, the parent bank or holding company cannot refuse to participate in rescue efforts on the grounds that they would negatively affect their reputation and future commercial opportunities. In the end, risk management's main goal is to secure the long-term viability of each individual financial organization as well as the group as a whole. Where many entities operate under a common ownership, an integrated approach to risk management is required [4]–[6].

DISCUSSION

Risk Identification Approach

Each category of business and control risks is made up of a handful of broad risk components, which in turn are made up of a handful of risk factors and risk elements, each of which is distinct in nature and has its own identity. There are several factors that result in a certain danger. For instance, a downturn in the economy, poor borrower selection, or failed businesses may all increase credit risk. Each of these risky situations has the potential to produce credit risk. To gain a clear image of the risks, the bank may use a three-stage identification process: first, identify the risk components; second, the risk factors; and third, the risk elements. It is helpful to employ three stages of risk identification because it makes it easier to pinpoint the specific risk components that exhibit a reasonably high degree of risk and to come up with control measures that are just right for containing the

risks. It will be quite simple to develop strategies to control the risks if risk identification is done up to the finer element level.

Architecture for Risk Management

The design of the whole risk management framework that must be in place to manage hazards is referred to as risk management architecture. Since each bank has a different geographic distribution, activity type, business focus, and strategy, each bank will have a different architecture. Some banks could operate several international locations and do a significant amount of cross-border commerce.

The following criteria should be met by risk management architecture:

1. It need to provide a comprehensive method for identifying risks.
2. It should include all potential hazards, both internal and external to the company.
3. Techniques for separating the significant and significant risks the bank confronts must to be included.
4. It ought to have resources for quantifying and assessing risks.
5. It need to have controls and monitoring systems for hazards.
6. To reduce risks, it should include transaction- and portfolio-specific hedging techniques.
7. It should include processes for figuring out capital needs based on the shifting risk profile.
8. For the purpose of maximizing risk-adjusted returns, it should have methods for allocating capital among credit, market, operational, and residual risks.
9. It need to update the management information system automatically.

Tools and procedures for managing risks of various sorts and intensities should be included into the risk management architecture. The structure will be weakened and the bank will become susceptible in the absence of any one of the supporting instruments. If a bank, for instance, lacks a scientific method to detect hazards throughout the whole organization, the overall risks it faces may continue to be underestimated while having strong statistical models to quantify risks for a certain amount of business. The consequences may sometimes be severe if the bank's risk profile is incorrect.

The architecture for risk management consists of a number of components that must be constructed incrementally. At a minimum, the architecture should have the following components:

1. Methods and procedures for managing risks. procedure for identifying risks.
2. Tools for measuring risk.
3. Procedures for model validation and back-testing. instruments and methods for risk reduction.
4. Mechanisms for risk monitoring and control. system for managing information.
5. Assessment of capital sufficiency procedure. ways for allocating capital.
6. Structure of the organization for risk management.

Structure of the Risk Management Organization

The credit, market, and operational risks three key company risks should be handled by different administrative units within the risk management organizational structure. Due to their lack of importance, banks often do not have a parallel administrative unit to handle operational risk. Instead, they create distinct divisions to handle credit and market risks. Operational risk must be handled by a distinct administrative entity, since both its frequency and scale have greatly increased over time. In addition, banks often assign duties and responsibilities to operational personnel and risk management staff without distinguishing between the activities of taking risks and monitoring and controlling those risks. This violates the concept of avoiding conflicts of interest in duty delineation. When assessing the organizational needs for risk management, banks should be aware of these two concerns. The information on all forms of exposures, as well as the netting and hedging of exposures, will be accessible in one location, making a centralized organizational structure adequate to satisfy the objectives of an integrated approach to risk management. Because top executives monitor the whole process, a centralized structure has the benefit of reducing the likelihood of omissions and preventing slipups. It will make it easier to map out the risk profile and determine the capital adequacy needs in light of the shifting risk profile. Along with expert committees and senior management, a supreme body at the bank's main office will handle risk management duties. The ultimate body will be in charge of overseeing the full cycle of risk management operations, from system evaluation and modification to the creation of policies [7]–[9].

The bank should acknowledge that there are conflicts of interest between the operational function and the risk management function before completing the design of the organizational structure. Separating

reporting duties from business management duties is a good idea, and the control function's independence should be maintained. For instance, there should be a division of labor between the trading, reporting, monitoring, and control activities in the treasury department. To prevent conflicts of interest, banks should clearly define the tasks and responsibilities of each worker and designate distinct units or teams of employees to handle the operational function and the risk management function.

Credit and market risks are highly correlated, and banks often handle these two significant risks in tandem using a two-track strategy. The repayment responsibilities on foreign currency loans significantly increase as interest rates rise and exchange prices decline. This condition results in a wave of borrower defaults. When the exchange rate declined as a result of a significant imbalance between the demand and supply of U.S. dollars, many financial institutions and private entities in Thailand that had borrowed foreign currency from foreign banks defaulted on their repayment obligations, which ultimately caused the Asian financial crisis. It became clear that market risk-related variables might contribute to credit risk. Therefore, it is necessary to integrate the functions of managing credit risk with managing market risk. The staff controlling credit and market risks should work closely together under the organizational framework. The organizational structure's design is influenced by the organization's size and geographic distribution, commercial activities, and assortment of goods and services. However, banks that combine credit, investment, securities, and insurance activities should have a larger structure with specialized departments and cells to manage each category of risk. Traditional banks that only engage in credit and investment activities may have a simplified structure. Banks typically have distinct divisions for managing credit, market, and operational risks; but, if they also conduct insurance and securities trading in addition to their core banking activities, they should have separate administrative units to handle the relevant risks. If the bank's primary line of business is trading in financial instruments, they must have specialized teams of employees who are exposed to market risk, and they must also employ actuaries if they directly operate an insurance company or perform insurance-related duties through wholly or partially owned subsidiary units.

Large credit, investment, and related party exposures have a significant potential for loss. The likelihood of hazards materializing from these exposures is

significant since single-person decision-making may lead to mistakes in judgment, or cooperation may be at play behind these kinds of transactions. To prevent conflicts of interest and protect the bank's interests, a committee approach to decision-making on significant and related party exposures may be suitable. To address risks from exposures to big and related parties, expert committees should be constituted with members from both within and outside the company. Risk assessment on a bank-wide scale is a component of an integrated risk management strategy. The departments in charge of credit, market, and operational risk will evaluate risks specific to those divisions. However, it is essential to create a distinct risk management department that will serve as the nodal department, operate independently as a parallel unit, combine hazards on an enterprise-wide basis, and oversee all risk management activities. To monitor the risk management obligations of other departments and support the bank's board and committees, it need to have its own credit, market, and operational risk wings.

The board of directors will be at the top of the organizational structure for risk management, and it will be their main duty to comprehend the nature and importance of the risks the bank confronts and to put the necessary instruments and procedures in place to manage those risks. However, it is crucial to make sure that the board members are competent for their roles and unaffected by anybody within or outside the company. Since risk management is a highly specialized and delicate job, it is crucial that board members are aware of their responsibilities, advocate ethical behavior, set up "checks and balances," and avoid conflicts of interest. Regardless matter whether the bank is privately or publicly held, the board member selection process must be open and transparent.

A more condensed group of professionals who are familiar with and exposed to risk management should be included in the organizational structure. This will be a screening and advising body with varying levels of authority that meets more often than the board and advises the board on all matters related to risk management. The risk management committee of the board will be this group, which will be made up of two to three board members and a few senior executives, such as the CEO and executive directors. The operations of the other lower-level committees will be supervised and coordinated by this committee. The heads of operational departments may be co-opted as non-voting members of the committee, where

applicable. The operational leaders should be allowed to share their opinions when developing risk management policies and plans since they have close access to market information and are in charge of company growth. Experts from inside and outside the company working together will aid in developing impartial opinions and preventing conflicts of interest. Different sources of banking operations produce credit, market, and operational risks. Therefore, there should be provisions in the organizational structure for specialist committees that will serve as intermediary entities and handle each of these business risks. Since there are connections between various kinds of risks, the executive directors and business line heads of the functional departments will make up each of these committees. The organizational structure will include committees and departments for credit, market, and operational risk management in addition to a separate risk management department that will serve as the secretariat of the committees because the higher- and lower-level committees will need the support of full-fledged departments and other supporting staff. The organizational structure should provide the necessary tools for an impartial assessment of the risk management function. Top management responsibilities include developing risk management policies and strategies, setting risk limits, and approving risk assessment methods and models. The operations personnel are responsible for putting policies, plans, and tactics into practice. Therefore, it is crucial to make sure that the creation of policies and their execution are always consistent. Additionally, the bank management must reassure the bank supervisor that the tools and procedures it uses for risk assessment are reliable and that the bank's risk profile reflects a real-world scenario. Therefore, there is a need for a review of the whole risk management process, which should be carried out by those who are not involved in risk management. The internal audit department might be given the duty; they will conduct an impartial review of hazards and risk management systems and processes and pinpoint any areas that need improvement. It will evaluate the situation's facts and inform the board. As a result, the organizational structure for risk management should include the internal audit department.

The organizational structure should take into consideration the need for technical staff and risk management professionals to assist the risk management committees and departments. Support from both technology and staff is essential to keep the risk management function functioning effectively. The

information technology division, which will be in charge of creating or contracting out software systems, will provide the technical assistance. In addition, the technology department will work independently to gather, analyze, and offer information and data in accordance with the unique needs of the departments managing various risks. The human resources division will be in charge of providing the personnel support, and it will be its job to hire the right people and train them to undertake risk management duties [8], [10].

Risk avoidance and risk elimination are not the goals of risk management. It tries to minimize the effects of hazards and maximize the return on assets after adjusting for risk. Since the fundamental goal is to guarantee the solvency of the banking firm as a whole, including the subsidiary units owned and managed by it, a risk management method cannot be function- or activity-specific. An enterprise-wide evaluation of risks must be ensured via an integrated approach to risk management. An integrated strategy highlights the relative importance of the many risks the bank is exposed to and aids in striking the ideal corporate balance between risk and return.

A few risk factors and a few risk components make up each major category of risk. To identify risks in a scientific way, it is necessary to first determine the risk elements that make up a risk factor, followed by the risk factors that make up a broad risk component. Banks should establish an appropriate risk management architecture in harmony with their business operations and business strategies. The organizational structure for risk management should include different committees and departments to handle operational, market, and credit issues as well as separate divisions to handle risks associated with insurance and securities trading. In addition, the bank needs a distinct risk management division to oversee all risk management tasks.

CONCLUSION

In conclusion, Organizations use the foundations of risk management as a foundation to handle uncertainty and safeguard their interests. Organizations may proactively address possible hazards, improve decision-making, and boost resilience by adopting risk identification, assessment, mitigation, and monitoring procedures. Building a resilient company that can successfully manage risks and seize opportunities in a dynamic business environment requires both the establishment of a strong risk management framework and the development of a risk-aware culture.

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Risk Management Systems and Processes

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ABSTRACT: Risk management systems and processes play a crucial role in enabling organizations to identify, assess, and mitigate risks effectively. This abstract provides an overview of risk management systems and processes, highlighting their importance, key components, and benefits for organizations. Risk management systems encompass the tools, technologies, and methodologies used to support the overall risk management process within an organization. These systems facilitate the collection, analysis, and reporting of risk-related information, enabling informed decision-making and proactive risk mitigation. They provide a structured and systematic approach to managing risks and help organizations monitor and respond to emerging threats.

KEYWORDS: Enterprise Risk Management, Incident Reporting, Key Risk Indicators (KRIs), Monitoring, Surveillance, Operational Risk Management, Risk Assessment.

INTRODUCTION

The risk management policy statement, which is the written commitment of the board of directors to maintain an effective risk management system, reveals the bank's risk management philosophy. The sequence of risk-taking operations to reduce losses from hazards are described in the risk management policy document. It is difficult to imagine a model document on risk management policy since banks have different business activities, business focuses, and, more significantly, risk-bearing capacities. Based on its resources, experience, capabilities, and limitations, each bank should have its unique risk management procedures. Despite the fact that each bank has its own risk management procedures, there are certain traits that are universal to all banks.

The tone of the risk management policy is determined by the company objectives and corporate vision. Guidelines for risk acceptance levels for various transactions and operations should be included in the policy document, together with information about the bank's risk appetite and the risk restrictions that apply throughout the fiscal year. The document should highlight the management's dedication to advancing risk management systems and procedures as a requirement under the corporate governance system and communicate the management's resolve to adhere to a high quality of risk management practices in the course of business. The policy should act as a reference guide on risk management for all bank employees and should explain the justification for taking risks within a range of predetermined limits. The connections between the risk management plans and the bank's strategic plans should be highlighted.

The policy's goal is to make it clear to the staff that the identification of risk and calculation of the amount of risk involved in every transaction are essential steps in the due diligence process and that all business proposals must be evaluated from a risk perspective before approval. The risk management policy does not address particular concerns relating to the administration of loans and investments; rather, it is a broad statement of the bank's risk management philosophy and risk appetite. Separate loan management rules, investment management policies, and other policies pertaining to the bank's operational area must be developed [1]–[3].

The bank must be careful while drafting the risk management policy to avoid instilling fear and unfavorable emotions in the minds of the operational employees. The policy should give an assurance that the bank won't retaliate if genuine judgments have been made incorrectly and work to increase employee trust in managing the bank's operations. It should also encourage workers to take fair risks for the development of the company. The policy should make clear the management's commitment to enhancing employee abilities in order to provide them the confidence to manage risks.

Financial markets are turbulent because of the rise in cross-border commerce and the regular alterations to trade and fiscal policies by governments throughout the globe. The assumptions that were established when the risk management rules were drafted are altered by changes in market circumstances. Therefore, the policies must to be regularly evaluated and adjusted to reflect changes in the market. The bank management should use this opportunity to emphasize the bank's commitment to following best practices in risk

management and reassure the external auditor, the shareholders, and the depositors that their interests will be protected as well as the financial sector regulator.

DISCUSSION

Risk Appetite

The amount of risk that the bank plans to absorb within the limits of its overall risk-bearing capacity is known as its risk appetite. The capability of the bank to tolerate risk is significantly influenced by the capital level, the liquidity profile, the obligation structure, the cost of funds, and the desired return on funds. The risk appetite is also influenced by the market competitiveness, employee skill levels, and workplace culture since, when all else is equal, low skill levels and unethical behavior lead to greater risks. The fact that banks deal with public deposits and are subject to tight regulatory oversight mean that they are unable to have an aggressive appetite for risk. Quantifying risk appetite makes it easier to understand, however decision-making is often involved. varied business sectors, including corporate finance, wholesale banking, retail banking, and commercial real estate financing, will have varied levels of risk tolerance. Similar differences exist between credit and investment activities, as well as within the credit activity itself, depending on the kind of credit being used, such as export credit, industrial credit, trade credit, or credit for agricultural reasons.

For commercial expansion, the bank must decide what level of risk it is willing to accept. The declaration of risk appetite lays the groundwork for establishing corporate goals, choosing the right mix of businesses, and choosing the risk levels of loans and investments. As a result of the sheer volume of transactions that take place every day, it is difficult for banks to define their risk appetite for every kind of transaction. Therefore, a set risk appetite is established for the company as a whole or for certain business areas. The level of a bank's risk appetite might be set as "high," "moderate," or "low," or it can be balanced. A bank with a high tolerance for risk will favor doing business primarily in the areas of financial instruments, futures trading, and real estate financing. High capital, strong risk management procedures, and effective control technology are required of such a bank. Banks that have a moderate risk appetite and average risk management and risk control skills often take a cautious strategy. They widen the range of operations and focus on loans and investments with lower risk.

However, these institutions must protect themselves against poor performance and low returns. The third kind of bank is one that engages in both conventional and speculative businesses in an effort to balance high-risk, high-return and low-risk, low-return activity. High-risk appetite banks often seek more lenient criteria for company approval.

A bank may declare that 30% of its overall business will fall into the high-risk category, 40% into the moderate-risk category, and 30% into the low-risk category. The amount of risk associated with each exposure must be determined in order to compare the distribution of assets across these three primary risk categories. The distribution of assets according to risk grade may be collated and mapped with the stated risk appetite after the rules for assessing risk levels are created and the numerical values for assigning risk grades are fixed [4]–[6].

Risk Capacity

Risk limits, which are established for various operational sectors and activities, are the limitations of possible losses that might occur if the estimated hazards materialize. The scope of risk restrictions that the line managers will work within should be specified by the banks in the risk management policy document. The amount of business that may be done in certain sectors and the caliber of assets that can be accepted are both governed by risk limitations. When risk occurs, it has an effect on profits that is eventually represented in a decrease in owned funds, which include capital, free reserves, and general provisions. In relation to the probable capital loss that it can withstand, the bank might set the monetary values of risk limits. After setting aside a certain amount to cover residual risks, the overall risk limit may be determined as a percentage of the total owned funds and divided across credit, market, and operational risks. Assume that the bank's owned funds total \$3 billion in the United States and that the bank's board of directors set the aggregate risk limit at 25% of owned funds. A total of US \$750 million will be the annual risk cap. The remaining \$50 million may be set aside for residual risks. Of this amount, \$450 million can be used to address credit risk, \$150 million to cover market risk, and \$100 million to cover operational risk. The risk limits, which reflect the individual upper and lower bounds, are not distributed among various risk kinds on a hypothetical basis. The distribution of limitations is influenced by business prospects, market competitiveness, the bank's planned

business mix, and prior loss experiences in various business lines.

The potential loss from market risk on investments and other trading assets can be estimated through the value-at-risk and other statistical models, as can the potential loss from credit risk on direct credit exposures, investments, and derivative transactions that contain an element of credit risk. According to the New Basel Capital Accord's recommendations, sophisticated measurement methodologies or internal measurement models may be used to quantify the potential loss from operational risk resulting from people, process, technology, and external events. After designating a suitable sum to cover residual risks, the entire quantum of possible losses from credit, market, and operational risks may be split between them in the proper ratios to represent the overall risk limit. The sublimits provide the upper bounds within which each of these risks' potential losses are anticipated to fall.

The bank must set maximum exposure limits for concentration risk, variable business risk, and big exposure risk within the total credit risk cap. Credit concentration, facility concentration, regional concentration, sector concentration, and business line concentration are all sources of concentration risk; thus, the maximum exposure limit should be established for each kind of concentration.

Significant exposures to the capital market, the commercial real estate market, and other industries that have comparable asset valuations and risk sensitivity provide volatile business risk. Limits on exposure to volatile or sensitive industries should be set by the bank. The term "large exposure" refers to both individual borrowers and borrower groups and varies across nations and institutions based on the size of their balance sheets. When a bank's exposures are limited to a small number of individual borrowers or a small number of borrowing companies that are owned and managed by the same management, large exposure risk develops. The bank will have to establish limitations on exposures to a particular borrower and the borrower group as well as define what a big exposure is. In the loan management policy document, which is an addition to the risk management policy document, the maximum exposure limitations for a single borrower, a borrower group, and big exposures should be specified in detail. The bank may set sublimits in various areas as needed. Additionally, the policy statement has to outline the acceptable exceptions to the restrictions as well as the processes for their approval and management. The risk limitations will fluctuate annually and will need to be

updated to reflect changes in market factors and patterns of volatility.

Systems for Managing Risks

For carrying out various sorts of operations, such as credit sanctioning, fund raising and investing, trade finance, merchant banking, investment banking, advisory services, and so forth, banks must establish processes. In addition to accounting practices and reporting guidelines, instructions on the systems and processes for booking transactions must also contain procedures for identifying and managing risks related to the activities and transactions. To make sure that the systems and processes correctly collect and analyze the risks related to the transactions, the bank must periodically test them. Even if the business activity, the degree of exposure, and the kind of transaction may not change, procedural flaws will raise the amount of risk. The workforce of the majority of banks has access to operating manuals for use in doing business. Operation manuals must be updated on a regular basis to reflect changes in risk management guidelines and practices.

The creation of systems and practices for risk identification, measurement, mitigation, monitoring, and control is risk management. At least four important regions will be covered by the systems:

1. Procedure for identifying risks. tools for measuring risk.
2. Risk-reduction strategies.
3. Machinery for risk monitoring and management.

Process for Identifying Risks

In order to identify risks, all operations, transactions, company locations, and related entities must be considered. The process of identifying risks is complex, and it is challenging to establish protocols that are sure to capture every risk the bank confronts. The identification process is dynamic and must be changed whenever there are changes to the business's policies, plans, or emphasis, when a new activity is introduced, or when an old activity is discontinued. The full risk profile won't be shown if certain risks are not recognized at all or if some hazards are only partially captured when several risks are present. If risks are underestimated due to the inaccuracy of the risk identification system, banks face the danger of failing to meet the capital adequacy criterion.

When developing the risk identification process, banks must take a few broad considerations into account. Since a single transaction may result in the emergence of several risks of different types, the first difficulty is related to the challenge of detecting these risks. For

instance, there are at least three different sorts of hazards connected to loans given to clients in their own currency. Risks related to profitability, liquidity, and default may arise from the loan transaction. The borrower's potential inability to repay the loan might lead to default risk, which would eventually lead to loan loss. Since the stream of payments due throughout the course of the loan which fall into distinct time buckets will not be paid, there may be a liquidity risk associated with the defaulted loan. For a group of clients together, the total amount of defaulted loans might result in a liquidity mismatch for the bank. Large client repayment obligations might force the bank to find alternate sources of funding at a greater cost in order to meet its obligations by the due dates. Since the bank is not required by conservative accounting rules to register interest revenue on failed loans on an accrual basis, earnings risk will become apparent. Similar to this, an investment in the bonds of a domestic corporation entails interest rate risk, which may cause a decline in the market value of the bond, credit risk if the bond issuer fails to return the principal when due, earning risk as the periodic coupons on the bonds may stop being paid, and liquidity risk as there may be a resource gap as a result of the issuers of the bonds failing to return money to the bank.

The investment transaction may include exchange risk and country risk if the bonds were issued in foreign currency by a corporation based in a different nation. If the exchange rate has increased after the bonds were received in foreign currency, the conversion of the principle and interest payable on them might result in a loss of value in local currency. The investment transaction will also contain nation risk since the government might renounce its obligations on all foreign loans, impose limitations, or outright prohibit any transactions using foreign currencies. Furthermore, it may be challenging to accurately classify hazards since the lines between various risk categories are often blurred. Sometimes it's difficult to determine with absolute confidence whether the risks arising from a certain transaction are operational, market, or credit risks [7]–[9].

The second challenge has to do with the difficulty in determining the degree of risk from certain sorts of transactions, which by their very nature include various degrees of risk. Due to the variances in loan terms or debt instruments' maturities, investments in term loans or debt instruments, for instance, incur various degrees of risk. Longer-term loans and financial instruments pose higher risk than those with shorter terms for the return of value. This is due to the

fact that the possibility of default increases with the length of the time required for the return of the money, as uncertainty or the likelihood of unfavorable occurrences increasing with time. As a result, standards must be established for determining the risk level in accordance with the maturity dates of term loans and dated financial instruments. Additionally, the business cycle risk must be included when determining the risk associated with term loans and long-dated financial instruments. The second factor may not be as important for short-term instruments.

The third concern has to do with how to assess the strength of the bank's corporate governance framework and the status of the workplace culture. Risk events are more likely to occur if the business culture is not risk-sensitive and the management tolerates excesses and exceptions without adequate checks and balances. More operational risk occurrences will occur if the bank's control mechanisms are insufficient. In order to make adjustments by raising the level of risk from those activities and transactions that are vulnerable, it will be prudent to be aware of the current state of the workplace culture, the management's functioning style, as well as the staff's seriousness in the application of controls throughout the bank. If there is historical evidence of control failure inside the company, the risk identification process must be rigorous.

The absence of a comprehensive strategy for identifying risk from derivative trades is the fourth problem. Derivatives were often addressed on a stand-alone basis as the derivatives market grew and became a major source of financial instruments for risk hedging. Credit derivatives, interest rate derivatives, equity derivatives, and foreign exchange derivatives were all handled separately by the personnel in charge of the various functions, namely credit risk management, interest rate risk management, equity exposure management, and foreign exchange risk management. This segmented approach falls short of accounting for the overall credit risk posed by various derivative product categories. It is essential to entrust derivatives professionals with the oversight of the derivatives portfolio and to identify the risks holistically.

Risk Assessment Instruments

Risk measuring and risk identification are complimentary processes. Once a risk has been discovered, its size must be evaluated in terms of both the risk level and the possible loss amount that might

result from the assumed risk. While statistical models calculate the possible loss, rating models assess the amount of risk. So, both the rating models and the measurement models will be part of the risk assessment tools. Three fundamental goals should be attained by risk measurement methods and procedures. First, in various economic, market, and environmental situations, the assessment tools should be able to calculate the possible loss that the bank may incur due to its overall exposure and other obligations. The amount of economic capital that the bank should have on hand as insurance against its risk-taking operations is the potential loss, which includes both anticipated and unforeseen losses. An indication of the strength of regulatory capital to protect against risk-related losses is the potential loss.

The possible loss will be a decisive element in determining the intended amount of regulatory capital if the management want to keep it above the required minimum. Banks may adopt a voluntary goal of maintaining a higher regulatory capital ratio, such as 11% or 12% of all risk-weighted assets. The benchmark for aiming the capital level may be the mapping of the projected potential losses for four to five years resulting from the risk measuring models used by the bank. As a result, the management will be better able to plan ahead for the mobilization of extra capital sources to support future company development. The New Basel Capital Accord mandates that banks maintain their total capital ratio at no less than 8% of their total risk-weighted assets, which will rise to 10.5 % by 2019 and include a capital conservation buffer in accordance with Basel Committee on Banking Supervision recommendations.¹ The bank regulator/supervisor may occasionally specify a capital adequacy ratio higher than the minimum of 8% for all banks or some specific banks. The bank regulator will base their assessment of the bank's capital need on the pattern of expected future losses in the institution.

The ability of the risk assessment tools to effectively quantify prospective losses that are specifically related to borrowers, assets, or facilities is the second goal. The tools that include rating models should also be able to spot the borrowers whose financial standing has declined and who are more likely to fail to pay back the bank's obligations by the due date than others. Additionally, the tools should track how much asset prices have dropped in proportion to their book value. The decrease in asset values, the anticipated future loss, and the quantity of provisions needed to satisfy prudential accounting norms. Loss assessment on a

client basis and facility basis will be too laborious for banks with a high number of loan accounts made up of both big and minor exposures. These banks will need to use both group-based procedures and individual account-based ways when dealing with comparable kinds of tiny accounts. Accordingly, the assessment tools should include formulas for estimating average potential loss for collections of assets with comparable properties as well as borrower- or facility-specific potential loss for significant exposures. The quantity of borrower- and facility-specific provisions, as well as the overall provisions the bank is obliged to make against expected losses in asset values, will be determined by the amount of possible loss determined by the measurement models.

The third goal is for the bank to be able to determine the risk-adjusted return on capital in order to assess the effectiveness of various business lines' performance. Tools for measuring risk should show how much money might lose from business lines. The risk-adjusted returns on capital invested in various business lines may be computed using the expected loss amounts. The risk-adjusted returns will help the bank determine the operational effectiveness of each business line and the best volume of business across various business lines without going over the risk limitations and capital adequacy requirement. As an illustration, if the measurement tools show that the returns on capital used in the capital market business segment are low due to equity price volatility, it is prudent to gradually reduce capital market exposure and increase credit in the manufacturing or trade sectors where the magnitude of expected losses is relatively less and the returns on capital are relatively high. Thus, measurement methods and tools aid the bank in strengthening its risk management procedures. In addition, the bank will be assisted in developing risk management policies and guidelines by the study of possible losses that might result from various operational sectors. Credit, market, and operational risk limitations will be determined based on the magnitude of anticipated and unforeseen losses.

The risk measurement models should be altered to fit the needs of the bank. When selecting the models, the bank should take into consideration its size, business mix, volume, variety of goods and services, and staff skill set. Smaller banks that operate in the core banking sector may build up streamlined risk quantification methods. However, even simple models must adhere to two fundamental criteria: they must not only calculate risks but also highlight their qualitative nature. To assign risk grades to borrowers and use

those grades to determine the entry-point norms for taking an exposure, banks may set up internal credit risk rating models. These models can specify collateral packages, fix risk-grade-wise exposure limits, carry out portfolio appraisals, and estimate loan losses based on historical data. International banks with significant off-balance-sheet exposures and high volumes of business will need to set up reliable counterparty rating models and sophisticated statistical models to estimate expected and unexpected losses from various asset classes.

According to the New Basel Capital Accord, banks must establish distinct risk assessment models for estimating possible losses from operational, market, and credit risks. The New Accord has given the banks a several alternatives for determining the capital needs to meet these risks. The Standardized Approach and the Internal Rating Based Approach are the two methods that the New Accord specifies for measuring credit risk. The latter comes in Foundation and Advanced editions. Banks may choose to assess market risk using either the Standardized Measurement Method or their own internal risk measurement models, provided a number of requirements are met. The Basic Indicator Approach, the Standardized Approach, and the Advanced Measurement Approach are the three options that banks can use to measure operational risk². Banks can select any of the options or approaches recommended by the bank supervisor and set up risk measurement models in accordance with the selected approach [7]–[9].

Back-Testing and Validation

Banks should test the rating models on a regular basis to ensure that the assumptions and other parameters are accurate after developing credit risk measurement and rating models as well as a value-at-risk model based on identified risk characteristics and presumptions. The validity test for the bond rating model was unsuccessful, and it should be considered to be lacking if an investment in AAA-rated bonds becomes bad within a one- to two-year time frame. In such cases, the bank should review the risk components, risk factors, scoring standards, weights, and assumptions and make the required adjustments. The outputs of the risk assessment models should also be compared to actual losses from the recent past to see whether they accurately represent the reality. This goes for prospective losses related to facilities, borrowers, and the whole business. Back-testing is the name of this procedure. The model-generated findings

for a few selected time zones and the observed variances may be compared to the actual credit losses that have happened on a few selected credit exposures both in default and nondefault situations. If the model outputs don't match the actual condition, the measurement models' inputs will need to be adjusted as appropriate. Comparing the model output with the real market-derived loss on investment and trading for various blocks of holding periods allows for testing the value-at-risk model in a similar manner. The investment portfolio's composition varies virtually every day, and the models should take these changes into consideration. The assumptions and parameters will need to be revised if the results of the value-at-risk models are not closely related to the real losses that occurred in the market at the relevant period. The models themselves may sometimes need to be changed to reflect the trend of the empirical findings. A group of impartial individuals unrelated to the creation of risk measuring tools should be entrusted with the task of validation and back-testing. Alternately, professional companies may be used on a recurring basis to provide internal model validation and back-testing[10], [11].

CONCLUSION

In conclusion, Organizations are given the framework they need to successfully detect, analyze, and reduce risks via risk management systems and procedures. Organizations may proactively manage risks, improve decision-making, and safeguard their interests by putting in place solid systems. In a business environment that is becoming more complicated and unpredictable, investing in risk management systems and promoting a risk-aware culture help organizations become more resilient. They also increase stakeholder trust and help organizations continue to succeed. To react to changing threats and shifting business environments, risk management systems and procedures must be continually improved and periodically reviewed. To enable continual improvements in risk management procedures, organizations should build a culture that stimulates risk awareness, encourages reporting of concerns at all levels, and supports a learning attitude.

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A Discussion on Risk Mitigation Techniques

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ABSTRACT: Risk mitigation techniques are essential strategies employed by organizations to reduce the likelihood or impact of potential risks and safeguard their objectives. This abstract provides an overview of risk mitigation techniques, highlighting their importance, common approaches, and benefits for organizations. Risk mitigation involves taking proactive measures to manage and minimize potential risks that may adversely affect an organization's operations, reputation, or financial stability. Various risk mitigation techniques can be implemented to address different types of risks. These techniques aim to either prevent risks from occurring or reduce their potential impact if they do occur.

KEYWORDS: Contingency Planning, Diversification, Insurance, Internal Controls, Loss Prevention, Risk Avoidance.

INTRODUCTION

Techniques and tactics for risk mitigation are crucial components of the risk management process. In the banking industry, risk cannot always be completely eliminated, but its effects may be lessened. Mitigation strategies work to lessen the level of risk attached to a specific transaction, a group of related transactions, or banking activity in general. Risk reduction depends on the activity, the transaction, the facility, and the consumer. For lending, investment, trading, and other types of activities, there are several mitigation measures. For instance, in order to mitigate credit risk, the bank may demand a bigger margin and actual collateral before approving a significant loan amount. The bank may limit its investment in bonds if the interest rate on the bond market is particularly volatile in order to prevent significant losses from a decrease in bond prices. In the same way, if the movement in the exchange rate is particularly unpredictable, the bank could wish to close out the open position in foreign exchange [1]–[3].

Risk may be reduced in three main ways: by tightening up follow-up processes and practices, setting boundaries and benchmarks, and outlining guidelines and hedging strategies. To make sure that the follow-up steps following transaction execution are not slackened, the bank should turn on the monitoring and vigilance equipment. In essence, this is a bank internal matter. From the start of a financial transaction through the conclusion of the connection with the client, the field staff should take preventative measures to make sure that the risks do not rise as a result of careless follow-up. It should be understood that improving internal policies and processes is just as crucial as other risk-reduction measures.

Limiting the size of the balance sheet and implementing checks and balances to manage risk are the second way to reduce risk. First, depending on the stability of its own capital, the bank may decide to maintain its business volume within reasonable bounds. Second, the bank may set strict criteria for company admission and safer exposure limitations. Banks often create norms and boundaries, albeit the form and scope may differ from one bank to the next. The third risk-mitigation strategy involves engaging in derivative transactions with outside parties to balance the risks. The ability to engage third parties for risk reduction is often transaction-, product-, or client-specific. Making a list of the occasions and circumstances in which the bank should turn to third parties for risk reduction is not easy. The bank should develop risk mitigation policies and plans that are appropriate for various circumstances, print them out, and distribute them to the operational employees and risk management.

Risk Observation and Control

Risk control comes before risk monitoring, and the two go hand in hand. As the operational environment and market factors change, the amount and severity of risks continue to fluctuate. A monitoring committee should be established inside the bank's structure for ongoing risk assessment. Personnel free from operational responsibility should make up the monitoring group. In order to make sure that developing risks stay within the risk ceilings set by the bank's board of directors, the group should study and monitor hazards that are reported from various places. In order to adjust the business mix to the changing risk profile, the monitoring group will work closely with the operational units.

Depending on their size and activity, banks may have different risk monitoring and management systems. Small banks engaged in conventional banking activities may have very straightforward reporting and monitoring mechanisms that primarily focus on lending, investment, and treasury operations. The reporting formats and monitoring and control methods will need to be complex for major banks, which have a considerable amount of cross-border activity, a variety of goods and services, and operations in several places both directly and via subsidiary entities. Banks need to set up a separate apparatus to evaluate the monitoring and control systems' effectiveness, sufficiency, and integrity on an independent basis.

Information Management System

The Management Information System's Usefulness

To complement the risk management system, banks must set up a specialized management information system. The MIS handles transaction data collecting and processing, data storage and retrieval for business operations at the bank, and the creation of statements, financial reports, and analytical notes for management use. It offers assistance for transaction processing, payments and settlements of the bank's dues, electronic transfer of money, automated cash withdrawal, and Internet banking. It also aids management in decision-making, planning, program execution, and activity control.

DISCUSSION

Design of the Management Information System

In addition to internal data about their own operations, banks also need external information on banking and financial services. The architecture and depth of the MIS will vary amongst banks due to differences in risk management strategies, processes, and models. The whole risk management process, which includes balance sheet management, business strategy development, and risk monitoring and control, should be supported by the MIS.

Support for Risk Management from MIS

Each of the bank's business operations creates one or more different types of risks, and when the company expands and the size of its balance sheet rises, risk management essentially transforms into balance sheet management. The primary function of the MIS is to assist company growth and maintenance in order to maximize the risk-adjusted return on assets. All data and information should be kept up to date, and the MIS

should enable technology-based decision-making and balance sheet management. The MIS should provide useful and pertinent data so that choices may be made quickly. It should, for instance, respond to various business questions like: How will a 25 basis point reduction in lending rates affect profit? How would an increase in deposit interest rates of 25 to 50 basis points for various maturity periods affect the cost of funds and income spread? In addition to helping the management cope with crises and stressful events, it should supply data and knowledge to deal with various scenarios and shifting market conditions [4]–[6].

Statistical models and risk management tools should also be included in the MIS, along with data and information important for company operations. The models for value-at-risk, stress testing, sensitivity analysis, scenario analysis, and other methods of calculating credit risk should all be kept there. Information pertinent to decisions about loans, investments, and other transactions should be provided, together with details on how those choices may affect the bank's risk profile. For instance, if a bank approves a new credit line for a counterparty, the MIS should allow the bank to assess the level of risk involved in the transaction, calculate the amount of additional capital needed to take the exposure on the books, and estimate the potential loss if the counterparty defaults. The MIS should also be equipped with all the data required to do logistical analysis, competitiveness analysis, risk analysis, and profitability analysis if the bank decides to launch a new operation. The objective is to make the most of the information technology system that the bank has deployed and to provide a thorough MIS to assist the business management process.

A robust MIS is needed to assist the formulation of corporate development plans with an emphasis on risk reduction and risk management. The emphasis of corporate growth and sustainability strategies often shifts from year to year. The launch of new goods and services as well as company expansion into new places need the backing of suitable strategies. The MIS should aid in business planning and strategy selection in order to meet the goals outlined in company plans. For instance, if a bank wishes to raise net profit by 20% in a given year, the MIS should offer all pertinent data and information to help formulate the best strategies to achieve the goal. The bank may choose for a straightforward approach that tries to reduce operational costs while increasing interest and fee-based revenue. It might also elect to focus on big exposures and wholesale operations, where net interest

income is higher, operational costs are lower, loan maturities are short, and the likelihood of default is lower. The MIS should also produce reports on the likelihood of liquidity gaps at various times and assist in formulating appropriate strategies to obtain funds at the lowest possible cost at the appropriate time in a competitive market if a bank anticipates a shortfall in liquidity during a specific time of the year due to asset-liability mismatches.

In order to carve out a niche for themselves, several banks plan to establish a core expertise in certain categories of financial services. These institutions will need to provide a product of outstanding quality and establish effective delivery systems that will be challenging for rivals to imitate. The MIS must continuously help the bank in these circumstances so that it may maintain its competitive edge and deliver timely, hassle-free service. In reality, banks may use their MIS to provide themselves a competitive edge in certain industries.

The risk management system's monitoring and control procedure is essential. It comprises of safeguards put in place by the bank to reduce and control risks within certain boundaries. The role entails routine evaluation of each business line's performance with an emphasis on business limitations, company expansion and profitability, and the evolution of the risk profile over time. To follow the development of each business line and monitor the performance of business managers, risk controllers, and other important individuals, the MIS should give all pertinent information in organized forms. It should gather information and specifics from required control returns, process them, and provide information reports that let the bank keep track of the risks associated with each business line in respect to the required risk ceilings. The MIS should be set up to allow the staff members in charge of risk monitoring to gather all pertinent information, spot warning signs, and notify those who need to know at each level.

The obligation for monitoring extends beyond the corporate level to the intermediate level and the field level as well. As a result, both the regional offices and the branch offices should have access to the MIS, but suitable security measures must be in place to prevent illegal usage. The operational personnel must continuously assess the condition of the accounts of major borrowers on a field level. Only when the field team has sufficient knowledge of the borrower's current situation, including the most recent statistics on production, sales, profitability, share price fluctuations, etc., will the monitoring be useful. The MIS need to provide client-specific information on

significant hazards. To assist the monitoring team in detecting significant exposures that offer substantial risks to the bank, performance metrics and financial ratios of businesses involved in various operations should be included in the MIS.

The process of corporate governance includes the review and assessment step. To satisfy legislative duties, supervisory requirements, and to evaluate the efficacy of systems and processes, the board of directors and senior management regularly monitor and evaluate the operations and functions of the bank. The review agenda is often extensive, and the assessment is based on the actual performance data as well as other data from a period close to the review. Because of this, the MIS plays a crucial role in supporting the review and assessment function.

Here is a list of examples of data and information that the MIS should gather and store:

Market competitiveness and data analysis of market share. macroeconomic proxies.

1. Environment outside the body.
2. Budgetary and fiscal policies of the government.
3. Trade, export, and import regulations.
4. Programs for government borrowing.
5. Profiles of similar banks and other rivals.
6. Commercial potential, limitations, and legal barriers in the command area.
7. Company profiles by year.

Annual company strategies, growth objectives, and accomplishments. Asset-liability profiles broken down by client, maturity, and interest rate.

Confirmation of Risk Evaluation

The methods and practices put in place by the bank to identify, measure, monitor, and control risks should be assessed by a separate team unrelated to the risk management responsibilities. It entails reevaluating operational, residual, market, and credit risks. The verification team must reassure the bank management and bank supervisor that the systems and processes are sufficient to capture enterprise-wide risks and that the bank has enough financial reserves to cover any possible losses resulting from all risks. Along with assessing the effectiveness of the internal control system and confirming that the bank's capital adequacy assessment complies with regulator requirements, the team should confirm the accuracy of the risk assessment processes. To increase the credibility of the bank management in supporting solid corporate governance procedures, this role might be delegated to the internal audit department and sometimes to the external auditors. According to the

Basel Committee on Banking Supervision, internal auditors are in charge of evaluating the efficacy of risk management protocols and techniques.

Development of Human Resources

The counterparty rating models and the risk measurement models must be adjusted to take into account the regular changes in the risk assessment environment. Instead of purchasing models created by other organizations, banks should create their own models since doing so would eliminate the need to contact them periodically for inspection and change. Banks are encouraged under the New Basel Capital Accord to create internal risk assessment models. To convert to the IRB technique for gauging risk, banks will need to construct various models to grade various counterparties.

Credit risk should be quantified using standardized techniques, market risk should be quantified using internal models, and operational risk should be quantified using standardized techniques or cutting-edge measurement techniques. The New Accord places a strong emphasis on building internal risk assessment capacities, which necessitates organizational human resource development. To properly manage the risk assessment function, banks need three types of skilled staff. The initial group of employees will create counterparty rating and risk quantification formats, templates, and models. The third type of individuals will carry out validation and back-testing as well as offer adjustments. The second category of individuals will deploy the models and approaches throughout the company. The bank will also need more staff members with experience in different risk management roles.

The process of risk management is complex, but it can be understood and handled by the organization over time with the development of specialist abilities. Banks must acknowledge that risk management is a specialist role, handle the problems with human resource development separately, and provide enough funding for specialized staff members inside the company. Banks should maintain a second line of defense in addition to front-line personnel with particular expertise to handle risks. The actual risk arises when banks make the mistake of assuming that risk management is simply another operational job and that there is always enough staff inside the company with the necessary exposure and abilities to handle risks.

High Level Management Commitment

Important criteria of the corporate governance codes and ethics include the top management of the bank's significant participation and their unwavering dedication to providing resources for effective administration of the risk management function. The board of directors, board committees, and the senior bank officials, such as managing directors, executive directors, and general managers, make up top management. The senior executives and the board of directors have separate sets of obligations and responsibilities with regard to risk management. Significant determinants of the amount of engagement include the ownership structure of banks, the makeup of the board of directors, and the processes used to select board members. Different banks have different policies about how board members and other senior management executives are divided into roles and duties. Whatever their duties, the senior management's engagement and dedication should be readily apparent.

A number of data may be used to evaluate the level of senior management commitment and participation. First, at least a few board members and top management should be knowledgeable about banking-related hazards and able to recognize the dangers that their own bank confronts. The senior management should actively participate in the approval of risk management plans and policies, develop models to evaluate prospective losses, and define risk tolerance levels in proportion to the bank's net worth and risk-bearing capability. The bank regulators in many nations use due diligence while approving the nominations of board members and certain key employees in the bank to ensure the board is properly constituted.

Second, the senior management and board members should be dedicated to conducting regular evaluations of the risk management function, recognizing the system's strengths and flaws, and taking steps to enhance it. They should create business strategies that are in line with risk management guidelines and risk caps, and they should keep an eye on the work of risk managers, risk controllers, and department heads. Third, the board of directors should establish the proper organizational structure, provide sufficient funds, and, where necessary, recruit risk management specialists. The top management should assign individuals with the right training and expertise to the most important risk areas and make sure that the risk management function is routinely subjected to independent audits [6]–[8].

Requirement for Capital Adequacy Assessment And Disclosure

The New Basel Capital Accord provides banks with a variety of choices to assess their capital needs and mandates that they maintain sufficient capital to fund all risk-taking operations. According to a directive from the Basel Committee on Banking Supervision, bank supervisors must make sure that "the supervisory review process recognizes the responsibility of bank management in developing an internal capital assessment process and setting capital targets that are commensurate with the bank's risk profile and control environment. Supervisors are required to analyze how well banks are determining their capital requirements in relation to their risks and to act as necessary.

One of the fundamental tenets of supervisory review is that "banks have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels." In a context where banks have greater freedom to choose their own capital needs, the Basel Committee on Banking Supervision has imposed a series of disclosures with the goal of promoting market discipline among banks. The Basel Committee has not set specific thresholds for disclosures and "believes that the user test is a useful benchmark for achieving sufficient disclosures," but a "bank should disclose key information to the market participants on matters relevant to risk exposures, risk assessment, and the capital adequacy assessment process" in order to achieve "a consistent and understandable disclosure framework that enhances comparability."

The evaluation of capital needs is a technical task, and it requires sensitive disclosure of important aspects of how a bank operates, such as its risk management processes and procedures. To carry out these functions, the bank should establish specialized teams that are not responsible for risk management or risk control. The risk management system includes the creation of internal capacities to handle these two crucial tasks: determining if a company's capital is enough and completing the disclosure documents.

Prioritizing Risks

Due to variations in operations, business mix, and business volume, banks have different levels of credit, market, and operational risk exposure. It is challenging to identify the specific kind of danger that needs to get the most consideration and be taken more seriously. Banks encounter a variety of hazards that are often blended together and cannot be divided into separate chambers, making it difficult to determine the order of

prioritizing and resource allocation between diverse risks. If the quantity of losses resulting from various categories of risks cannot be accurately calculated, setting priorities becomes more challenging. It is sometimes impossible to know which should be given greater attention when selecting the priority since the real losses resulting from risks and the frequency of loss occurrences will vary from year to year. As a result, it is challenging to offer a formula for allocating resources and capital among the three main kinds of risks. The most advantageous course of action is to go with the market trend and prior loss experiences. Banks should create a risk management strategy while considering their capabilities, knowledge, and strengths and shortcomings. The bank's activities should be carried out in accordance with its capacity for risk taking, and the policy document should outline the bank's risk management philosophy, risk appetite, and total risk limit.

For various operational areas and operations, banks should set risk boundaries and specify the range of possible loss that line managers should work within. They should regularly update their risk ceilings to reflect shifting market dynamics. The overall risk cap may be set as a proportion of all held money and distributed across credit, market, operational, and other residual risks. Banks should set restrictions on credit concentration, sensitive sector exposure, and big exposures within the overall credit risk limit. Risks that affect the whole organization should be included in the risk identification process. It should detect increased risks from term loans and long-dated financial instruments and record numerous hazards that result from a single transaction. The effectiveness of the control system, management style, and employee work culture all have an impact on the risk detection process. The occurrences and severity of risk are increased by managerial laxity and ineffective control mechanisms. These elements should be taken into account by banks when evaluating risks across the board. Both risk rating and risk quantification models are used as risk measuring methods and methodologies. The measurement models assess the possible loss that the bank is expected to experience under various situations. The rating models the degree of risks connected with borrowers or facilities. To calculate possible losses due to various risks, banks should create distinct credit, market, and operational risk assessment models. Periodic back testing should be used to assess the models' correctness.

Risk measurement models should determine the amount of anticipated and unforeseen losses on the

bank's total exposure, calculate the amount of potential losses specific to borrowers and facilities, and allow the bank to determine the risk-adjusted returns on capital used in various business lines. The model should serve as a benchmark for determining the amount of provisions needed to protect against loss on asset values as well as the capital level needed to cover probable losses. Risk reduction depends on the transaction, the product, the facility, and the client. For credit activities, investment activities, and trade activities, there are many mitigation measures.

Since the scope and severity of risks are always shifting at a rapid rate owing to changes in market factors and the operational environment, banks should set up strict risk monitoring and control mechanisms to evaluate risks continuously. To assist risk management and balance sheet management tasks, banks should build up a tailored management information system. In order to strengthen internal skills to create risk management tools and procedures and evaluate capital sufficiency, they need acknowledge that risk management is a crucial role and handle human resource challenges [9]–[11].

CONCLUSION

In conclusion, Techniques for mitigating risk are essential instruments for managing and lowering possible hazards in companies. Organizations may improve their resilience, safeguard their interests, and achieve long-term success by combining risk avoidance, risk reduction, risk transfer, risk acceptance, and diversification techniques. Implementing effective risk mitigation strategies helps firms handle uncertainty successfully, cultivates a proactive risk management culture, and inspires stakeholder trust. Organizations should do extensive risk assessments, identify the most important risks, and prioritize their mitigation activities in order to apply risk mitigation approaches successfully. In order to adapt their risk mitigation methods to changing risk environments, they need develop clear risk management policies and procedures, distribute resources wisely, and constantly evaluate and update them.

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Lack of Due Diligence in Loan Processing

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ABSTRACT: *The lack of due diligence in loan processing is a significant concern that exposes financial institutions and borrowers to various risks. This abstract provides an overview of the consequences and implications of inadequate due diligence in loan processing, highlighting the importance of thorough assessments and risk mitigation measures. Due diligence is a critical process that financial institutions undertake to assess the creditworthiness and risk profile of borrowers before granting loans. However, the absence or inadequate execution of due diligence in loan processing can lead to detrimental outcomes for both lenders and borrowers.*

KEYWORDS: *Creditworthiness, Fraud Detection, Income Verification, Know Your Customer (KYC), Loan Underwriting, Regulatory Compliance*

INTRODUCTION

As part of the conventional lending process, banks investigate credit proposals from prospective customers to see if the customer's project or company has a realistic possibility of succeeding. Banks gather information and specifics about new customers from publicly available papers and the market, process and analyze that information to produce three sets of data, screen the clients, and choose the ones who meet the criteria for loan sanctioning. The first collection of data concerns the customer's social background, professional history, and market position. The analysis gives the bank the chance to create an opinion about the client's sincerity, moral character, and reliability. The second set of data covers the project's technical viability, infrastructural support, input and labor availability, product quality and marketability, and the customer's management skills and prior experience. The research determines if the client has a suitable level of infrastructure support and competence to operate without interruption in a market that is competitive.

The customer's financial situation is covered in the third piece of data. The customer's financial and accounting data is processed to calculate common financial ratios including the debt-to-equity ratio, current assets-current liabilities ratio, turnover ratio, profitability ratio, and others. If a project or firm is financially feasible, it may be determined via the examination of financial ratios and the balance sheet. In order to determine whether a customer will be able to repay the loan, banks create cash flow and funds flow statements based on common assumptions about the costs and benefits of the proposed project or

business. They also perform sensitivity analyses to determine how much room there is for honoring the repayment obligation in the event that input costs and output prices change adversely. In this approach, banks conduct a thorough due diligence investigation in order to make a well-informed and supported judgment on the granting of credit [1]–[3].

If properly followed, the real due diligence procedure for credit approval is expected to lower the occurrences of loan defaults. The due diligence procedure, however, might be hampered by a few variables in the competitive financial markets. The first aspect is the setting in which loan managers do their business. It is often observed that the measures used to evaluate the success of the loan manager are typically quantitative rather than qualitative. In addition, company policies on incentives and penalties are sometimes opaque. Banks set high lending goals and provide incentives via awards and promotions when goals are met. The evaluation process is diluted by the target-oriented strategy used to achieve credit expansion that is hastened. Additionally, fierce market rivalry that gives consumers power to choose the parameters has an impact on the evaluation standard. When loans are syndicated, the fast-track technique of appraisal for getting a stake in a loan forces the loan managers to make judgments quickly without carefully evaluating loan offers.

Lack of trustworthy data about the state and future prospects of the economies in which the bank works is the second element that has an impact on the due diligence process. Many nations keep their long-term budgetary, commercial, and import-export strategies secret. Additionally, since international accounting and auditing standards differ, it is difficult for lenders to evaluate the balance sheet and financial statements

of their clients realistically. Due to the lack of some essential facts, banks are often forced to forego the due diligence process and instead rely their loan decisions on their gut-based assessments of risk. The mechanical technique, which banks use to decide which loans to approve or deny based mostly on credit score or credit risk grade, is the third element. Banks sometimes prioritize risk grading rather than thoroughly evaluating lending bids. If the grading system is flawed, the computation of risk grade may be inaccurate. Making decisions entirely based on risk evaluations might result in more defaults. In addition to assigning a risk grade, banks should do due diligence while making loan decisions in order to reduce the rate of defaults.

The propensity of banks to raise nonfund-based commitments in order to enhance fee-based revenue, especially when their profit margins are reduced in situations with decreasing interest rates, is the fourth element that weakens the due diligence process. A dramatic increase in the issuance of financial guarantees, letters of credit, and underwriting commitments might result from the concentration on nonfund-based facilities. The threat comes from the inadequate proposal evaluation process, not from the rise of nonfund-based companies. For the award of nonfund-based facilities to customers, the evaluation and inquiry are often not thorough. The appraisal criteria is relaxed since it is thought that the bank's obligations are contingent in nature, and if they do emerge at all, they will do so in certain circumstances and in the future. Under a context of declining interest revenue, banks often use the approach of increasing nonfund business because they may generate money without disbursing cash. However, it happens often that financial guarantees and letters of credit end up becoming bank liabilities since the clients didn't keep their end of the bargain. The system is poor because nonfund-based commitments' related risk is undervalued, and the due diligence process is conducted with a laxer attitude. The majority of the time, banks fail to evaluate how devolvement from nonfund-based commitments would affect the customer's cash flows and fund flows, as well as if the revised cash flows will allow the customer to pay the dues resulting from the devolvement of contingent obligations [4].

DISCUSSION

Inaccuracy in Entry-Point Rating

When making choices on loans and advances, banks use customer or facility ratings. They create a set of guidelines for beginning a new credit relationship as well as for maintaining credit with current clients. The necessity of a minimal entry-point risk grade for approval of new loan offers is a fundamental component of an efficient credit risk management system. Either internally, using a model for internally generating risk ratings, or externally, from rating agencies, determines the borrower's risk grade. External rating agencies only score a small percentage of their clientele, and when they do, they only assess major enterprises and multinationals. As was demonstrated by the incorrect ratings given to mortgage-related securities that were downgraded within a year, which led to a crisis in the American financial market and contributed to the financial meltdown in 2007, ratings by reputable external rating agencies may still not be appropriate.

For lending sanctioning and loan pricing, banks depend on their own credit risk assessment or credit scoring algorithms. However, the rating will be inaccurate if the rating system is not complete or is not consistently validated. If certain crucial inputs are missing, the internal rating is also probably going to be off. In these situations, the risk evaluation may not highlight any possible flaws in the loan offers. The credit risk rating framework must be comprehensive, adaptable, and aware of evolving risk variables that affect or change the customer's risk profile for the risk assessment to be accurate. The risk grade issued will be incorrect if the internal risk assessment system does not contain methods for automatically taking unfavorable changes that occur in the economy, the financial market, and the capital market into account. The consumer will be unfairly judged based on that rating, and the loan's true risk level will be greater than what the risk grade indicates. Before the risk ratings of both new and existing clients are changed to reflect the evolving risk variables, there is usually a little delay. Credit issues develop as a result of inaccurate entry-point rating assignment and the delay in updating the ratings in response to changing circumstances.

Unnecessary Complacency in Lending Against Collateral

Since it is assumed that credit exposures backed by collateral are fully recovered in the event of a borrower failure, lending against collateral is seen as a safe practice. However, banks have experienced significant

losses as a result of depending only on collateral for lending, whether as a result of a decrease in collateral values, the lack of a market for the sale of collateral, or as a result of the drawn-out legal process required to realize collateral values. There are two categories of collateral assets: financial collateral and nonfinancial collateral. Equities and debt instruments that serve as financial collateral are particularly susceptible to changes in market factors. Even little changes in interest rates or currency exchange rates might cause significant changes in their pricing. Banks may choose to overlook the cyclical nature of these assets' values in favor of the marketability of the financial collateral used as security for loans. However, an increase in market interest rates might result in a significant decline in the value of the financial assets used as collateral. The amount in default may not be equal to the value obtained through the sale of the collateral. In times of extreme market volatility, even the recommendation of increased margins on financial collateral to safeguard loans against the decline in collateral values may not be sufficient [5]–[7].

Banks often lend against non-financial collateral as well. They make loans and advances secured by mortgages on real estate, structures, equipment, and plants. They also provide financial assistance to consumers who want to purchase personal property over which they maintain hypothecation rights. When clients fail, banks often struggle to sell non-financial collateral since there aren't any established marketplaces to facilitate the selling of used goods. Additionally, the value of the collateral may significantly decrease with time. Most often, there will be a distressed sale, and the amount obtained won't be enough to pay off the loan sum.

Transparency Issues with Related Party Lending

Related party lending is the term used to describe credit facilities given to companies whose owners or controllers are directors, senior management, or employees of a bank. It also covers loan facilities provided to businesses in which the bank's top management, directors, or staff have a direct or indirect financial stake. On occasion, the previous groups of people exercise control over the individuals responsible for running the businesses that owe money to the bank. In these circumstances, the dominating interest is not immediately apparent. The term "related party" will thus apply to both those who have vested interests in the businesses that are owed to the bank as well as those who are blood relatives of the borrowers. Granting credit to related parties is often not merit-

based lending, but if the banking rules and bank regulators tolerate it, there is nothing inherently wrong with it. This is because most frequently, the due diligence process is not completed for making loan choices. Due to the underlying transactions' lack of transparency and the absence of legislation requiring mandatory public disclosure, the related party credit portfolio's status remains murky. In most cases, related party lending taints the credit portfolio and sometimes causes significant financial losses.

In situations involving related parties, credit issues occur when the methods and procedures established for giving credit are not fully followed, preserving an arms-length gap. Frequently, the associated party is uncreditworthy, the credit amount issued exceeds what is permitted by industry standards, or it exceeds the party's ability to repay the debt. Credit terms are manipulated, and exemptions and relaxations are permitted that are neither defensible on prudential grounds nor acceptable to other consumers. The issue is not limited to the loan application procedure; it might develop at a later time as a result of the bank employees' laxity in monitoring and following up on related party credit, which degrades the credit quality. Privately held banks or cooperative banks, which operate mostly in rural regions and cater to low-profile clients, are more likely to engage in related party lending. Directors and other officials with the authority to extend credit are sometimes appointed to roles in privately held banks by individuals with financial clout, political clout, and a desire to gain unfair advantages from the bank. The criteria for issuing credit become less strict as a consequence. Due to the management committees' intrinsic weaknesses, which are controlled by members who lack professionalism but enjoy political favor, as well as the government's attitude of permissiveness, the practice is more common among cooperative banks. Credit restrictions and denials are often not merit-based in cooperative banks. Due to the lack of transparency, cooperative banks' credit portfolios are often tainted and difficult to assess. In certain nations, the issue of related party lending is addressed by banking rules and regulations that prohibit the granting of credit to a director's family or to companies in which the director has a stake. But because to the challenges in establishing a connection between bank directors and their representatives and the owners of borrowing businesses or the absence of a precise definition of a controlling interest, the law has proven to be insufficient.

Concentration of Credit is Common

Concentrations are most likely the key factor causing serious credit issues. Any exposure where the potential losses are high in comparison to the bank's capital, total assets, or, when suitable controls exist, the bank's overall risk profile is said to have credit concentrations. Substantial exposures and the possibility for extremely high percentage losses in the event of default might both be factors in very substantial losses. The bank is vulnerable to unfavorable changes in the region where the credits are concentrated if there is a high degree of concentration. Credit concentrations are divided into two categories: conventional credit concentration and other credit concentration.

Conventional credit concentrations include geographic concentration, industry concentration, and sector concentration. They can relate to extremely high exposure to a single borrower or group of borrowers. For instance, credit concentration in the commercial and residential real estate markets of Thailand and Hong Kong contributed to the financial crisis in Southeast Asia in 1997, while credit concentration in the residential real estate market of the United States led to the financial crisis in the United States in 2007.

Consolidated conventional credit also includes:

Concentration by facility type, such as fixed-term loans, standby commitments, purchasing and discounting trade bills and checks, as well as investing in corporate debentures and bonds. A concentration of loans secured by the same kind of collateral, such as a mortgage on real estate, a vehicle loan, or the pledge of stocks and bonds. The whole spectrum of operations that include counterparty risk, not just credit exposure alone, should be considered when determining whether or not a concentration exists. Banks sometimes lack the ability to avoid a certain degree of focus, either because they lack access to various parties or lack the trained personnel to handle a variety of tasks. Due to their inability to compete with established market leaders in certain industries and their lack of financial buffer, small banks are more likely to acquire portfolio concentration.

If banks take measures to reduce the added risk from concentration, concentration by se is not the only factor used to reject loan offers of high quality. Some banks often find solace in concentration because they think they have an advantage over their competitors in specific categories of financial activity and have the resources to carve out a niche in certain markets. Bank supervisors and regulators urge banks to diversify their

loan portfolio and set upper limits for lending to a single borrower or borrower group in order to lower the risk of concentration. However, since concentration may be decreased over time, it is sometimes challenging for banks to lower concentration within a certain time frame. When the risk of possible loss from concentration is judged to be lower than that from forced diversification, the advantages of diversity may not always be worthwhile.

Common risk variables or connections between various risk factors give rise to the unconventional form of concentration risk. If there is an economic or price shock, significant exposure concentration, structured finance, or asset securitization are other possible causes. There is a significant association between credit risk, foreign currency risk, and liquidity risk, as shown by the 1997–1998 Asian financial crisis. Foreign banks that had significant foreign currency exposures in certain of the developing Asian countries were at greater risk as a result of the exchange rate depreciation. The unfavourable exchange rate fluctuation exacerbated the banks' debtors' domestic currency repayment requirements. Credit defaults grew as a result, and banks' liquidity conditions became worse. Structured financing situations can also result in non-traditional concentration risk, or it can result from the securitization of asset pools using leveraged special-purpose vehicles during an economic downturn, as was the case with the securitization of residential property mortgages in the US, particularly between 2000 and 2006.

Laxity in Credit Monitoring and Supervision

Credit quality deteriorates more quickly and there is a greater risk for loan losses in the case of default when there is lax monitoring and follow-up of the credit. The risk rating of borrowers shifts lower for a variety of reasons. The likelihood of a rating downgrade rises when post-disbursement credit monitoring is absent or inadequate. Under normal conditions, the loss given default and the exposure at default are likely to be higher than model averages, hence the amount of loss on poorly monitored credit will be higher than what is predicted by an internally built credit risk model. The bank need not rush to find exit routes for existing exposures and restrict further addition without first evaluating the opportunities and the prospects of business in the concerned subportfolios if higher incidences of downward migration of ratings are seen in some subportfolios without obvious reasons. The

bank has to determine whether insufficient credit oversight had a role in the reduction of ratings given to the borrowers in the impacted portfolios [8]–[10]. Monitoring and follow-up processes, as well as keeping an eye on the collateral, the borrower's business, and their actions, are all included in credit supervision. The most frequent flaws in credit administration include incorrect and incomplete documentation, a lack of bank vigilance regarding the final use of funds, the diversion of funds for speculative or unproductive purposes, account manipulation through intercorporate fund transfers by the borrowers, and the bank's laxity in monitoring the condition of collateral and establishing effective communication with the borrowers. These kinds of monitoring lapses result in greater credit losses. Banks sometimes neglect to promptly verify mortgaged assets, stocks, and other collateral charged to them, as well as to monitor the collateral's current state and value deterioration. Unreliable periodic collateral inspections enable dishonest borrowers to tamper with the security. Failure to monitor and oversee the borrowers' actions and loan accounts often results in credit issues.

Lack of a Mechanism for Credit Auditing

Lack of a credit audit process raises the likelihood that bad credits will remain on the bank's records. Credit audit or credit review refers to an objective evaluation of the quality of new credits approved by various organizational officials by a group of knowledgeable credit appraisers who are not involved in the credit generation or credit sanction processes. Credit exposures that are already recorded in the bank's books are sometimes included in the scope of the credit audit. All exposures that contain a default risk are covered by credit, including investments in bonds and debentures that act as credit substitutes. Credit audit provides timely assurance of credit quality and detects early warning signs for corrective action. Based on pertinent variables governing the soundness of loan proposals, banks set requirements for credit sanction. In order to ensure that credit is granted in accordance with the bank's approved policy and prescribed standard and that credit decisions are not influenced by unrelated factors or an undisclosed relationship between the sanctioning authority and the borrowers, credit reviews are used to reevaluate credit proposals. An efficient credit audit system should be aware of the need of continuous evaluations of current exposures as well as early reviews of new credit exposures. Due to variations in size, business operations, and exposure-

size distribution of loans, the floor limit of exposures for mandatory credit audit will change across banks. The alternatives for credit enhancement are reduced by late review, thus new loans should be audited as soon as they are sanctioned, covering at least substantial value exposures. Large exposures should be covered by an audit of credits that already exist in the bank's books on a sample or turn basis.

Credit audits accomplish two fundamental goals of sound credit management. In the first place, a well-established credit audit process quickly detects the loans and advances that exhibit early credit vulnerabilities and gives the bank time to come up with plans to safeguard its interests. Second, since the sanctioning authorities are aware that their acts will soon be subject to examination by a knowledgeable set of credit appraisers, the credit audit system inhibits them from granting faulty credits. By preventing the abuse of the authority to authorize loans, this limits the extent of operational risk related to the "people" component.

The goal of portfolio assessment is to evaluate each borrower's creditworthiness and possible credit losses from the portfolios. If the bank does not regularly evaluate its portfolio, it will not be able to monitor the quality of its credit portfolio. An efficient portfolio review system works to identify problematic industries and sectors in advance and aids the bank in formulating plans to reduce exposed exposures. The study sheds light on potential issues in certain areas and suggests ways to improve the current criteria for accepting credit. Different methods are used for evaluating portfolios. Based on economic study and market information on the sector or industry relevant to the portfolio, an impressionistic assessment of the portfolio may be made. An impressionistic perspective often offers suggestions about how the credit portfolio could be reorganized to prevent significant declines in credit quality. But the risk rating migration exercise and credit risk measurement models may be used to conduct a more realistic evaluation of portfolios. The quality of the portfolio may be assessed by monitoring how borrowers move between risk grades within the chosen time zones and by analyzing changes in the portfolios' potential losses over time. The bank should compare the trend shown by the analysis of the portfolio to its stated credit policy and restructure the portfolios if significant departures are found. Potential credit issues are concealed by a portfolio assessment system's absence.

Unprepared Introduction of New Products

Although it takes some time, sanctioning credits based on a thorough due diligence procedure offers advantages of its own. Without sufficient planning, adopting new methods for accelerating loan expansion carries a higher risk of default. This is especially true if the new credit evaluation system skips a thorough credit analysis in order to impose penalties more quickly. Along with expanding into new business sectors, banks also aim to accelerate the growth of credit by broadening the selection of loan products and adopting innovative lending strategies. Due to the complexity of certain credit products, decision-making processes must be specialized and tried and true. Dealings in funded and unfunded credit derivative instruments, for instance, carry a high level of risk due to the fact that the credit risk in these products is not always obvious and recognisable. To accurately analyze the precise type and magnitude of credit risk emanating from each derivative transaction, the authorities who deal in credit derivatives should possess specialized knowledge. Therefore, introducing new credit products without establishing appropriate handling processes and acquiring the necessary skill is very dangerous.

The adoption of new lending strategies based on credit ratings or scoring without going through a thorough credit evaluation procedure is another problem. The new method may include a shortened credit evaluation process. Credit choices based on automated credit scoring or credit ratings are likely to have greater default probability. Loans approved following a genuine due diligence exercise, on the other hand, have lower default probabilities because the entire loan approval process includes a thorough evaluation of the borrower and the project based on subjective and objective factors, as well as an assessment of the prospects for recovery under both favorable and unfavorable circumstances. If banks pick quicker pathways for credit sanctions, they are likely to sustain bigger losses. Before official implementation, the new lending methods or processes should be evaluated. In order to test the new methods, the bank may approve loans to a sample of borrowers, record instances of default, and compare the default statistics to the typical default probability on earlier loans of a similar kind. The bank should modify the appraisal process and add new criteria from the due diligence process to the rating model if the incidences of default on new loans are on the high side. Although the testing of the new lending methods may take some time, it will be profitable in the end.

With Preferred Borrowers and High Leverage

Credit choices and the amount of exposure that may be offered to debtors are made using the capitalization ratio, often known as the debt equity ratio. Term lending institutions describe it as the ratio between funded debt and equity, while commercial banks define it as the ratio of total outside liabilities to equity. The need of a benchmark debt equity ratio guarantees that the borrowers have a fair interest in the firm, encouraging them to operate it ethically and fulfill the bank's obligations. As a result, banks need to demand a minimum capitalization ratio.

The debt equity ratio ranges from 2.5:1 to 4.0:1, depending on the size of the industry, the types of projects, and their capital intensity. Industrial project ratios vary somewhat from those that apply to other forms of company, although most of the time the difference is negligible. Even though the debt equity ratio may be variable for loan approval, it will need to be within a safe range so that borrowers don't engage in "overtrading" and at levels that positively compare with the averages maintained in the banking sector. Banks often maintain a list of preferred borrower types that they consider to be financially stable and to have well-run, successful businesses. To keep the chosen borrowers on their books, they often ease the loan's terms and restrictions. Some borrowers take advantage of the bank's vulnerability to keep the relationship going by taking out huge loans from many banks without putting up equivalent amounts of equity. As a result, the debt equity ratio is now significantly higher than it should be. Credit issues inevitably arise when the debtors' ownership interests in the company are diminished. In the worst situation, banks suffer significant losses and they go bankrupt or become insolvent.

Area of Credit Risk Causes

Risk associated with credit has several reasons. Imprudent credit choices, poor credit management, the occurrence of unforeseen occurrences, and borrowers' rebellious attitudes are the most frequent among them. The majority of the time, a mix of internal and external variables causes credit risk for banks. Foreign issues mostly relate to poor macroeconomic fundamentals, a failing economy, and negative changes in foreign markets. These variables have a detrimental influence on the borrowers' businesses, which reduces their revenue and impairs their ability to pay their debts. The quality of banks' loan portfolios is impacted by external factors such as changes in government fiscal and budgetary policies, relaxation of import and

export regulations, enactment of trade restrictions and penalties, or unfavorable movement of financial market variables. External forces have a significant impact on the economy and may sometimes cause a slump. Because there is less demand for products and services during the downturn in the business cycle, economic activity slows down, production and sales volume declines, and output prices fall. The prices of bonds and stocks are also impacted by market mood. During an economic downturn, there are more instances of credit defaults, which results in a decline in the quality of bank credit portfolios. On the other hand, borrowers' income increases during the economic cycle's boom phase as a result of increased output and increased demand for products and services. The ability of the borrowers to repay increases, and there are fewer instances of credit defaults. Credit risk rises when the economy is in a slump and falls when the economy is doing well. The severity of the boom and bust phases of the trade cycle, in addition to the cycle's length, will determine how much credit risk will drop or grow as a result of changes in economic activity.

The main drivers of credit risk for banks are internal issues related to the borrowers and their enterprises. Larger credit defaults are caused by internal issues such company failures, financial mismanagement, a lack of corporate governance, and ineffective project management. The majority of bank credit portfolios are typically made up of loans for manufacturing activities and trade in products and services. Some of the typical causes that reduce production efficiency and product quality include a lack of the necessary administrative and technical expertise, ineffective manufacturing procedures, and inadequate inventory management. Poor sales management skills and a lack of demand for subpar products and services make the issue worse. These unfavorable elements lower the borrowers' income, harm their cash flow, and raise the likelihood that they will default. Additionally, because of the regular volatility in exchange rate fluctuations, borrowers who have taken out foreign currency loans from banks without insuring against exchange risk or who do not have foreign currency profits from exporting the items they manufacture pose a bigger credit risk to banks. One of the main factors contributing to credit risk is the dishonesty and immoral behavior of borrowers. Despite having the ability to pay back the loans, many borrowers are unwilling to do so. In order to get favor for loan waivers, they refuse to tell the banks the true state of their company.

The occurrences of loan defaults are increased by both internal and external causes, either alone or in combination. The effectiveness of the judicial system, how society views defaulting borrowers, and political meddling all have a significant impact on the atmosphere for extending credit as well as the amount of credit risk for the lenders, other factors being equal. Due diligence for loan sanctioning is hampered by fierce rivalry between banks, and big and financially powerful borrowers are given leverage to set the conditions. Credit issues later on result from banks often skipping the due diligence procedure and making credit decisions based only on credit ratings or credit scoring. If too much emphasis is put on credit rating or credit scoring, ignoring other aspects important to the loan evaluation, credit quality suffers.

The bulk of credit issues are caused by a mix of elements that are both internal and external to the bank and the borrower. Credit issues are brought on by credit concentration, an excessive dependence on loans secured by collateral, and a disregard for the established processes for giving credit to connected parties. Due to the opaqueness of related party transactions and the lack of relevant regulations requiring mandatory public disclosure, the related party credit portfolio continues to be uncertain. Ineffective credit supervision causes counterparty risk ratings to decline and raises the amount of credit loss. Additionally, the likelihood that subpar credits may stay undiscovered in the bank's records is increased by the lack of a credit audit mechanism. Similarly, the lack of a framework for portfolio review delays the identification of portfolio degradation for remedial action. Credit risk and the economic cycle are strongly correlated, and the degree to which credit risk will rise or fall as a result of the impacts of the cycle depends on the severity of the cycle's boom and bust as well as its length.

CONCLUSION

In conclusion, financial institutions and consumers alike face serious risks from a lack of due diligence in loan processing. To reduce credit, fraud, and systemic risks, extensive evaluations, background checks, and adherence to regulatory criteria are necessary. Financial institutions may improve their risk management procedures, safeguard their interests, and contribute to a more resilient and stable financial system by conducting thorough due diligence procedures and using technology. Additionally, borrowers are responsible for ensuring that loans are processed with appropriate diligence. Establishing

trust with lenders and displaying a great credit history may assist boost the possibility of receiving favorable loan conditions. These actions also promote openness in financial transactions and provide accurate and full information.

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A Study on Identification of Credit Risk

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ABSTRACT: *The identification of credit risk is a crucial step in the risk management process for financial institutions. This abstract provides an overview of the identification of credit risk, emphasizing its significance, key indicators, and the benefits it offers to lenders. Credit risk refers to the potential for borrowers to default on their debt obligations, causing financial losses to lenders. Identifying credit risk involves assessing the likelihood of such default events and the potential severity of their impact. By effectively identifying credit risk, financial institutions can make informed lending decisions, implement appropriate risk mitigation measures, and maintain a healthy loan portfolio.*

KEYWORDS: *Credit Scoring, Debt Service Coverage Ratio, Default Probability, Delinquency, Financial Ratios, Loan-To-Value Ratio, Non-Performing Loans.*

INTRODUCTION

Credit risk is created by market risk variables that are volatile, such as fluctuations in interest rates and currency values, as was plainly shown during the Asian financial crisis of 1997 to 1998. When the exchange rates markedly declined, the debt loads of the banks' customers who had taken out foreign currency loans grew significantly in terms of the local currency, which resulted in widespread credit defaults that caused the financial crisis. Due to the rise in interest rates and decline in the value of the dollar, banks now face a much higher credit risk.

Market risk refers to the potential for a decline in the value of assets or profits, while credit risk refers to the likelihood of failing to pay financial obligations. It is impossible to state with absolute confidence whether hazard has a relative higher effect on banks credit risks or market risks. The mix of the assets, the state of the economy's macroeconomy, the turbulence on the financial and capital markets, and the general operating environment all have a significant role. The intensity of credit risk is likely to be greater if loans and advances account for a substantial amount of the balance sheet, the operational climate is not favorable for the growth of healthy businesses, and the legislative framework supporting the lender is not strong [1]–[3].

Market and credit risks may be distinguished by a few features that reflect their actual nature. The first reason why credit risk often lasts longer than market risk is because banks find it difficult to liquidate loan assets on their own will, while there are established markets for selling investment assets. Investments have a far simpler exit strategy than loans and advances do.

Credit risk remains until the borrower and lender are no longer connected. This is especially true since credit exposures to consumers come in a variety of ways and may last for a very long period.

Second, the lack of a secondary market for the sale of loan assets makes it more difficult to determine a meaningful assessment of the fall in the prices of credit assets because market values of loan assets are unknown. However, since the market for selling sovereign securities, bonds, and stocks is often active, declines in the prices of trading book assets may be estimated with some degree of precision.

Third, while banks have the option to buy securities issued by sovereign nations, which are free of credit risk, they are unable to completely eliminate market risk due to the possibility of an increase in interest rates, which will result in a decline in the value of the securities. Banks also have more options for developing their investment portfolio in line with the maturity pattern of their liability portfolio because securities and debt instruments are available for a wider range of maturities and coupons than are options for developing loan portfolios because loan terms are determined by customer needs and preferences.

Fourth, although it is possible to simultaneously borrow money and lend it out in the same currency to guarantee the desired interest spread, credit risk cannot be completely avoided. The bank will not see a drop in interest spread as a result of unfavorable fluctuations in interest rates if the lending rate is set to float and tied to the borrowing rate. The lending bank won't be negatively impacted by changes in exchange rates if the loan is made in a foreign currency and the money is also borrowed from another source in the same currency. However, the lending bank will run into issues if the counterparty doesn't pay back the loan on

time since it will be required to do so by the creditor. Although interest rate risk and foreign currency risk may be avoided, the credit risk will still remain.

DISCUSSION

Credit Risk Identification Approach

Complications in Credit Risk Identification

Due to the fact that credit risk is concealed in investments and certain other forms of transactions, such as derivative transactions, risk managers confront several difficulties in recognizing it. The majority of credit risk for banks comes through loans and advances, but it may also come from other actions that don't usually entail lending money. Acceptances, interbank transactions, foreign currency dealings, financial guarantees, letters of credit, and derivative dealings in futures, options, and swaps all pose credit risk to banks. Both the banking and trading books include credit risk. Long-term loans and investments are included in the banking book exposures, whereas short-term investments including securities, bonds, debentures, shares, and foreign currencies are included in the trading book exposures. Off-balance sheet exposures, whose quantities are sometimes quite significant, also include credit risk. Therefore, identifying credit risk includes both on- and off-balance-sheet exposures [4]–[6].

Identification of credit risk is not without its difficulties. If banks wish to build an extensive credit risk detection method, they must address a few concerns. The first concern is the creation of adequate procedures to assess the level of risk brought on by the intricate ownership arrangements of big businesses and the extensive global distribution of their activities. Large corporations operate via a number of linked entities and have a number of production and trade facilities. Because each location is often seen by the consumer as a distinct entity in such situations, there is a strong likelihood that hazards will be understated. This kind of event might result in their using too much credit, diverting it, or overtrading, each of which carry extra dangers. There is often a lack of openness and disclosure on the part of the firms about the activities of their associate companies or ambiguity regarding ownership and economic ties between the establishments. Even while the bank has no direct exposure to the affiliated units, the commitments of a big corporation to its affiliated units for rescue in times of trouble enhance the risk of the latter since any issues faced by an affiliated unit may be passed on to the parent. Capturing credit risk from all of the huge

corporation's facilities on a bank-wide basis across all of the locations where the client and its related businesses do business with the bank is the true problem. Banks often make the error of estimating the level of credit risk posed by the counterparty at each location independently. They disregard the fact that the same counterparty or businesses linked with it do business with them elsewhere. The risk profile is changed when a facility is approved for the parent company or one of its related businesses, or when a transaction is carried out on their behalf. The segmented method does not adequately account for the amount and scope of credit risk that a bank faces due to exposures to major companies or to a group of businesses that are under the same management. The risk identification procedure must take into account any extra hazards arising from an intercorporate connection where one exists. To determine the overall credit risk from the customer-group that utilizes several facilities at various locations, the credit risk identification method must take into account the risks from each facility and each transaction on an integrated basis.

The second difficulty that makes it challenging for banks to determine the precise amount and scope of risk has to do with issues brought on by major firms' problematic borrowing practices. Multinational corporations borrow money from several sources and need different banking facilities. They seek loan facilities from many banks, in part due to their substantial needs and in part due to their desire to deepen their connection. They choose banks based on where they can get the best terms and conditions. By restricting the exposure size via loan syndication and loan participation, banks attempt to lessen the severity of risk. However, if multinational corporations borrow from various sources, the financials and other details that were taken into account by the lenders while processing the loan applications may not present the true picture. The status of collateral is also ambiguous due to the abundance of lenders. The enforceability rights are diminished and the lenders' unfettered access to the collateral is curtailed. Due to the contagion effect, the appearance of unfavorable characteristics in the borrower's accounts in one bank may change the risk profile of the borrower in other banks. Other banks either don't learn about this kind of development right away or it takes some time for them to do so. When numerous lenders are engaged in exposures to global corporations, banks need to be aware of extra risks.

The third problem has to do with the dearth of adequate methods for capturing the complete risks

arising from the variety of services that big businesses might get from the whole banking system. The businesses seek various banks for various fund-based and non-fund-based amenities. It might be challenging to accurately estimate the overall risks posed by big borrowers who have access to different financial resources. By way of illustration, the issuance of financial guarantees on behalf of a client may raise the amount of risk associated with the overdraft or loan facility provided to the same customer owing to the rise in exposure size or decrease in collateral coverage. Banks may sometimes be unaware of the full range of services provided by the banking system to multinational corporations. The difficulty is in developing a method that recognizes the whole risks associated with the bundle of services that big consumers get from the entire banking system.

The fourth concern has to do with how to define credit "concentration" using accept criteria and how to calculate extra risks that result from it. The bank must establish standards to recognize the regions of concentration in its operations and the scope of the concentration risk throughout the risk assessment process. Credit concentration, portfolio concentration, sector concentration, investment concentration, derivatives concentration, geographical concentration, and customer concentration—single client or group client concentration—all carry the danger of concentration. Typically, banks set risk limits to protect themselves from the concentration risk. The presence of concentration is often downplayed or overlooked in discussions on this topic, which is significant in this context since it prevents the identification of additional hazards. To raise the size of risks emanating from the appropriate location, the bank must first identify the concentrated areas. Methods for evaluating increased danger from concentration are difficult to define. One option is to adhere to the bank supervisor's regulations. Another alternative is to identify the portfolios where concentration occurs using industry best practices and comparable standards, and then raise the amount of risk in the calculation process by include a set proportion of the overall exposure in the relevant sector on an as-needed basis. Additionally, this will guarantee that sufficient capital is kept in place to protect against concentration risk on the increased exposure.

The final concern is whether the method for identifying risks in light of little exposures is adequate. If the bank has many clients who have received small-dollar loans, it will be challenging to rate each

borrower's risk due to the size of the work. Possible solutions include a straightforward asset-pool-based identification process. The homogeneity of borrower profiles and commonality of purpose, assets, or collateral must serve as the foundation for the pool strategy. However, risk identification must be done on a per-customer basis when the bank's credit portfolio comprises mostly of significant exposures. Banks that serve both big and small clients may combine asset-pool-based and individual customer-based strategies [7]–[9].

Risk of Credit in Problem Loans

Overdue loans are those that are not paid back by the due dates. For accounting purposes, these loans are classified as nonperforming or nonaccrual after a predetermined time frame, which typically ranges from one month to three months or sometimes six months. Normally, loans that exhibit negative characteristics but are not in a nonperforming status are designated as watch category loans or problem loans. In the case of nonperforming or nonaccrual loans, credit risk is considered to have realized, while it is about to materialize in the case of watch category or problem loans. Credit risk is expressed as the degree of risk associated with an exposure prior to default, such as high, moderate, or low, and it focuses on the likelihood of default. The magnitude of potential loss in the case of default is determined by the risk level. The amount of credit risk connected to a certain credit exposure will fluctuate over time, either increasing, decreasing, or remaining constant. Therefore, it's important to understand that loans with problems provide a bigger risk. Prior to a loan default, issue loans should be identified, and action should be taken to improve its condition.

Process for Identifying Credit Risks

Risk of Credit from Advances and Loans

Typically, loans and advances make up the majority of a commercial bank's assets. They provide loans and advances to a variety of counterparties, including people and sovereign governments, for a range of reasons, as well as to a number of economic sectors, including the industrial, service, commerce, agricultural, and export-import sectors. Large-value loans are provided to fund infrastructure projects or expensive items like ships and airplanes. Personal requirements are among the many uses for which small-value loans are made. Again, the terms of the loans and advances vary and include short-, medium-, and long-term. Credit risk is seen as the most evident, most common, and most substantial risk for

commercial banks due to these varied features of loans and advances. As a result, banks must devote a significant amount of resources to credit risk management.

There are at least three elements that affect the degree of risk, and the degree of risk is not the same for all loans and advances. According to the counterparty's makeup, the goal of loans and advances, and the maturity time, credit risk varies in frequency and severity. The bank's clients adhere to stronger financial discipline and more openness in transactions than those that are unregulated or disorganized, and they are less likely to default on loans and advances. For instance, a business client is subject to a number of requirements under the Companies Act. It is legally compelled to abide by accounting standards, follow corporate governance rules of conduct, keep its transactions transparent, and provide significant financial disclosures. The rules for individuals or single owners, partnership businesses, and other types of components, such as trusts, are less stringent. As a result, these consumers often violate rules of behavior, falsify accounting standards, and obstruct openness in business interactions. Therefore, it follows that the noncorporate elements pose a higher credit risk than do the public and private limited firms. Government rules in several nations require banks to lend and advance a specified proportion of money to certain clients, most of whom are poor and work in agriculture and small business. Loans to these unstructured, uneducated, and unskilled groups of individuals often involve a greater credit risk.

The objective of the loans and advances is the second component that creates credit risk, which may vary in degree. When loans are granted for productive purposes, such as the production of goods and services, the purchase of machinery, or the establishment of infrastructure projects like power plants, there is certainty of income generation for the loan repayment, so "what for" is more significant than "to whom." Due to the loans' self-liquidating nature, the level of credit risk is quite minimal. However, when loans are given for speculative or unproductive reasons, revenue creation is unpredictable, often insufficient, and dependent on the occurrence of fortuitous occurrences. These loans have a higher level of credit risk and a higher likelihood of default. As a result, lending for business reasons entails lower credit risk than lending for speculation or consumption.

The maturity length of loans and advances makes up the third element. The credit risk connected with a loan increases with the length of the loan's maturity term.

This is due to the fact that uncertainty increases with increasing distance in the future. Higher risk is a symptom of higher uncertainty. Over a longer time frame, the internal and external variables that affect company volume and revenue level variations are more likely to express themselves in some way. There are less risks involved with short-term advances that are given for working capital needs and are renewed every half-year or year than there are with medium- and long-term loans. When creating models for credit risk evaluation, it is important to be aware of these three aspects since they all contribute to varied degrees and intensities of credit risk.

Risk of Credit from Investment

Investment credit risk is the likelihood that counterparties may fail to make payments on financial instruments like securities, bonds, and debentures when they are due, as well as the potential loss to the bank from such a failure. Credit risk in investments includes the risk of eroding the value of the investment assets prior to default due to issuer-related issues, such as a deterioration in the issuer's financial position, in addition to the risk of counterparty default in repayment of the principal due on the financial instruments by the redemption date. Contrast this with market risk in financial instruments, where investment asset prices fall as a result of changes in market risk factors like interest rates and currency rates. Banks are required by the New Basel Capital Accord to retain more capital against financial instrument credit risk.

We are looking at the investment portfolios of commercial banks that place money in fixed income financial instruments for capital growth and interest generating in an effort to detect credit risk from investments. Commercial banks' investment operations are mostly limited to managing money and investments, and credit risk in investments may be determined by looking at the issuer's or financial instrument's internal or external rating. Without evaluating the competence and dependability of the agencies or doing a cross-check between external and internally produced ratings, banks rely on the ratings given by external rating agencies to provide assurance about the quality of the financial instruments. When ratings are not accessible, they also base their investing selections on their own risk assessment. Corporate bonds and debentures investments make up a sizeable portion of the total assets for many banks, in part because customers prefer them to direct credit lines and in part because banks themselves are searching for more lucrative revenue streams as

interest margins on loans begin to decline. However, banks often ignore the credit risk factor present in a variety of financial products. Financial products that are not rated provide great rewards but also substantial credit risk. Banks are exposed to a high degree of credit risk when their investment portfolio comprises mostly of unrated financial instruments.

Off-Balance-Sheet Exposure Credit Risk

The likelihood of loss that a bank may experience as a result of the counterparty's failure to execute duties or uphold commitments under agreements or contracts is referred to as credit risk in off-balance-sheet exposures. A variety of financial instruments are used to offer off-balance-sheet services. The exposures do not initially need the parting of cash, but in the event that the counterparty is unable to fulfill its responsibilities or respect its pledges, the bank will be required to cover the liabilities right away or suffer expenditures in order to uphold its own obligations. In transactions that are off-balance-sheet, banks accept potential obligations. Credit risk is included in the instruments since the bank might become liable for the assumed liabilities if the counterparty defaults on its contractual commitments. Financial guarantees, letters of credit, acceptances and endorsements, standby commitments and other financial instruments with comparable features, as well as derivative transactions, are typical off-balance-sheet items. The credit risk associated with various off-balance sheet exposure types varies. Four main categories may be used to classify the off-balance sheet items:

1. Warranties, indemnities, performance guarantees, and letters of credit.
2. Obligations that are unrevocable with both guaranteed and unpredictable drawdowns.
3. Transactions involving markets, such as those involving foreign currency, interest rates, and stock indices.
4. Customer claims resulting from management, underwriting, and advisory services activities.

The relative levels of credit risk associated with various off-balance-sheet instrument types vary in their magnitude and may be roughly divided into three groups. The BCBS has recommended classifying off-balance-sheet operations into three categories of risk in "The Management of Banks' Off-Balance-Sheet Exposures".

1. The definition of "full risk" is "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."

2. The definition of "medium risk" is "where there is a significant credit risk but mitigating circumstances which suggest less than full credit risk."
3. "Low risk" refers to situations where there is a little credit risk but one that cannot be disregarded.

Guarantees and acceptances, which serve as direct credit substitutes and entail credit risk comparable to that of a loan, are examples of instruments that fall within the full risk category. A full credit risk category transaction is one in which assets are sold to a third party with recourse and the bank maintains the credit risk. Financial instruments that may serve a variety of purposes should be grouped into the appropriate risk category according to the features of those purposes. In other words, financial instruments that act as direct credit substitutes need to be seen as being on par with loans and assigned full credit risk. Full credit risk will be included in irrevocable pledges, which are binding on the bank. The selling bank still has the entire credit risk on the assets sold when the assets are sold under the "repo" arrangement and the asset in issue is guaranteed to return to the selling bank. Due to the potential for the counterparty to the repo to fail to deliver the asset, an extra credit risk equal to the asset's replacement cost will need to be taken into account. It will be necessary to fully comprehend the credit risk associated with outright forward purchases.

Due to their short term and collateral protection, documented letters of credits should be classified as medium-risk credit products. Although indemnities, warranties, and performance bonds share some characteristics with guarantees, they cannot be used as direct credit substitutes, and the likelihood that a credit risk will materialize depends on the third parties' ability to fulfill their obligations. As a result, these instruments may be classified as medium-risk. The reduced magnitude of loss incurred by banks on these kinds of securities is another factor. To put it another way, "medium-risk" exposures are those that include credit risk arising from off-balance-sheet exposures where the instruments involved represent significant risk but where there are factors that may reduce that risk to a lesser extent. The credit risk associated with unconditional standby facilities, note issuance facilities, and revolving underwriting facilities is modest. When it comes to the first kind of facility, the bank is required to lend at the customer's request, and when it comes to the later facilities, the bank serves as the "underwriter." These instruments should be categorized at least as medium-risk instruments. There

are several transactions where the medium to modest credit risk is posed by the banking processes. Credit risk represents exposure to a bank and can be categorized in accordance with the risk rating of the latter bank, for example, in regards to bills of exchange purchased or discounted under a letter of credit that has been confirmed by another bank or trade bills that have been endorsed or accepted by another bank. Although there is no credit risk associated with the advising, agency, and underwriting responsibilities, there is a chance that the bank might be compelled to pay claims arising from carelessness or duty breaches. Due to the contingent nature of liabilities associated with off-balance-sheet exposures, banks often extend off-balance-sheet facilities without doing enough due diligence or exercising the same level of prudence that they do in the case of on-balance-sheet exposures. However, credit risk with off-balance-sheet exposures may sometimes be significant and result in extremely significant financial losses [10]–[12].

CONCLUSION

In conclusion, for financial organizations, identifying credit risk is a crucial component of risk management. Lenders may determine the probability and severity of possible loan defaults by examining indications including credit history, financial situation, and market circumstances. Effective credit risk identification promotes proactive risk reduction, supports informed lending choices, and helps the financial stability of lenders. The techniques for identifying credit risk are made even more effective by ongoing observation and timely evaluations. In order to spot changes in risk profiles over time, continual monitoring and frequent evaluations of borrowers' credit profiles are crucial. The ability for lenders to take appropriate action, such as starting loan restructuring or collection operations, depends on the timely detection of declining credit quality.

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A Study on Credit Risk from Derivatives

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ABSTRACT: Credit risk arising from derivatives is a significant concern in the financial industry, with the potential to impact the stability of financial institutions and overall market conditions. This abstract provides an overview of credit risk associated with derivatives, highlighting its nature, key factors, and the importance of effective risk management practices. Derivatives are financial instruments whose value is derived from an underlying asset or reference rate. While derivatives provide valuable tools for risk hedging and investment purposes, they also introduce credit risk due to their inherent leverage and complexity. Credit risk in derivatives refers to the potential for financial losses resulting from the failure of counterparties to fulfill their contractual obligations.

KEYWORDS: Counterparty Risk, Credit Exposure, Credit Valuation Adjustment (CVA), Default Risk, Derivative Contracts, Hedge Counterparties, Margin Requirements.

INTRODUCTION

Derivatives Characteristics

Complex financial instruments known as derivatives are created by financial engineers and connected to fictitious assets, events, or other benchmarks. They are distinctive risk management techniques that banks employ to transfer risk to another party or to hedge risk. Their values are derived from the underlying assets or the benchmark indicators; they do not have independent values. The market's depth and underlying instruments' liquidity are improved through derivative products. Financial derivatives are contracts with uncertain outcomes whose values are generated from underlying assets such as stocks, bonds, commodities, or currencies, as well as from benchmarks such as interest rates, exchange rates, and stock prices and indexes. With the use of derivatives, dealers may provide large volume transactions with tiny quantities of backup cash. This opens up the possibility for substantial leveraging or gearing. Derivatives thus have the potential to have the same economic effects as real transactions, despite the fact that they are off-balance-sheet transactions and represent hypothetical occurrences [1]–[3].

There are two categories of derivatives: standardized and customized. Standardized derivatives are those with straightforward specifications, broad market appeal, and simple offset mechanisms. Customized derivatives are ones that are created to specifically address the requirements of a customer. Derivatives are used by traders and speculators to achieve their own goals. While speculators utilize derivative

products to take advantage of market volatility and strive to generate windfall gains, traders adhere to the "buy low, sell high" philosophy to maximize their profits. Banks utilize derivatives to safeguard themselves against the diminution or loss of asset value. Based on anticipated changes in interest rates, stock indexes, equity prices, and foreign exchange rates, derivative products are created. Forward rate agreements, options, swaps, futures contracts, and hybrid instruments are the derivatives that are most often utilized.

Derivative products may be created with extremely adjustable features that take into account the required transaction size and contract term. A wide range of extraordinary flexibility in the design of derivative products gives market participants a chance to introduce high volatility that might increase trading risk in ways that would not have been possible under conventional market behavior. Both linear and nonlinear derivatives are possible. There are two approaches to reduce a danger. One method is to reserve a transaction at a certain price and keep it till maturity. By doing this, one will be able to safeguard cash flows from changes in the market's pricing. Linear derivatives are the name given to this kind of derivative product. Examples of linear derivatives include forward rate agreements, forward contracts, interest rate swaps, and financial futures. The alternative is to buy an option, a derivative instrument, to safeguard the depreciation in the value of financial assets against unfavorable movement in market factors. If the option holder believes they will incur a financial loss or their cash flow will be negatively impacted, they may choose to exercise their right

under the option. Option payoffs rely on how the market price changes around the strike price and the specified time horizon, making them nonlinear derivatives.

DISCUSSION

Derivatives Risks

The likelihood that a counterparty would fail to fulfill the commitments implied by derivative transactions between him or her and a bank, as well as the possible loss to the bank from the transaction, are referred to as credit risk in the context of derivatives. Derivatives of all kinds sometimes contain market risks rather than credit concerns, which are the latter. There is often no exchange of principle in derivative transactions since the underlying primary is purely notional. However, the bank is still at risk since it might face an unwanted or unexpected exposure in the event that the counterparty defaults. In the case of forward interest rate agreements, the counterparty's credit risk is minimal since it is only required to pay the interest difference on the specified notional principal. Credit risk is transferred to the Futures Exchange, where interest rate futures are exchanged and settled. Interest rate swaps carry a significantly higher level of credit risk since the counterparty is obligated to make a number of interest payments spaced out across a number of settlement periods. Credit risk also arises from derivative trades using options. In the case of currency options, the bank purchasing the option is free to swap a certain sum of one currency for another within a certain time frame at a defined rate. The counterparty's potential failure to fulfill its obligations under the contract exposes the bank to credit risk.

Risky items like derivatives have the potential to ruin people's finances. Financial mishaps in the past have not been caused by fundamental flaws in the design of derivative products, but rather by a lack of awareness of the complexity of the products, unauthorized use of the products by dishonest traders, or a lack of control over the use of derivatives outside of prudential bounds. Large investment banks, bank holding companies, and insurance companies in the United States sold credit default swaps, a "over-the-counter" derivative, on a massive scale to protect investors against payment default on mortgage-related securities, which exposed them to an unusually high level of risks in the absence of adequate capital and reserve funds. These huge financial firms had serious liquidity problems and enormous losses from derivatives exposures as a result of the dramatic

increase in home defaults, which ultimately caused the financial collapse in the US in 2007 [4]–[6]

Exposure to Interbank Credit Risk

varied types of banks in the financial system have varied ownership structures, goals, and roles. The substance and severity of the rules and regulations regulating various banks and financial organizations vary. The degree of public deposit mobilization rights differs as well across various bank kinds. Some banks are not subject to intense monitoring by the central banks or the regulatory authorities because of their limited access to public deposits and their limited banking license. Government orders government-owned commercial banks to carry out certain social duties, such as providing loans to the less fortunate members of society under lenient conditions. They are exempt from several banking rules and regulations' restrictions. As a result, even if these institutions are owned by governments, exposures to them are not risk free. Due to their aggressive business objectives, concealed related-party loan portfolio, and anticipated high returns on capital, many privately held commercial banks come under the high-risk category. In certain nations, cooperative banks are relatively prevalent, although they seldom follow the ideals of merit-based governance. Additionally, they are exempt from several legal and regulatory measures that may be taken against commercial banks. Cooperative banks are subject to both the standard banking laws and regulations as well as the acts and regulations of the cooperative societies. Their bylaws provide them permission to regularly do business with their members. Specialized banks, such as export-import banks or agricultural development banks, are not allowed to take public deposits receivable on demand and are not as closely regulated by the regulatory authorities as other banks. Bank risk profiles, as well as their levels of financial soundness and solvency, vary in light of these various qualities. As a result, neither are nor do the exposures of one bank to another bank bear the same amount of risk. Therefore, it is essential to understand the risk associated with interbank exposures.

In the regular course of business, banks engage in a number of transactions with both local and foreign banks. They trade in the foreign currency, derivatives, and real estate markets in addition to the call and term money, trade-bill financing, and capital markets. Banks give substantial loans to other players in the financial sector, hold deposits with them for certain lengths of time, and provide financing for both local

and international trade bills under letters of credits that they issue or that other banks affirm. They also engage in repo and reverse repo transactions on securities amongst themselves as well as lending money to third parties against the counter-guarantee of another bank. They engage in the buying and selling of securities, foreign currency, and the buying and selling of derivative goods. In accordance with the payment and settlement procedures, one bank owes money to other banks. All of these interbank transactions reveal large exposures between banks both within and outside of the nation. Interbank settlements are not risk-free since one bank could not fulfill its obligations to another bank in a timely manner.

In interbank transactions, credit risk includes the potential for one bank to fail on its obligations to another bank. Banks, financial institutions, and securities companies are included in the New Basel Capital Accord's list of counterparties that bear credit risk. The New Basel Capital Accord even acknowledges variations in the financial soundness and strength of various classes of banks and proposes the assignment of risk weights of various values in line with those banks' financial status or rating by the rating agencies. As a result, a bank will have to identify various degrees of risk from exposures to each kind of institution and categorize its exposures to other banks and financial institutions into distinct risk classes in line with the counterparty's financial soundness or rating.

Credit Risk Due to Global Exposure

Significant cross-border exposures exist for internationally engaged banks in the form of direct lending and investment. Due to the counterparties' foreign locations, these exposures also contain a nation risk component of credit risk. The exposures may be to the sovereign governments themselves, through direct lending for particular purposes or through investments in their securities, or to the government-owned entities, private corporations, and other parties, through project financing, working capital financing, and trade bill financing. Due to several fundamental aspects of cross-border transactions, these exposures include a certain amount of nation risk.

The possibility of the economic circumstances of the resident nations of foreign borrowers deteriorating gives rise to country risk in cross-border exposures. Interest rate and currency rate volatility may arise at any moment in nations where the macroeconomic fundamentals are weak and the financial system is

insecure. The capacity of borrowers to pay the bank's loans will be impacted by negative changes in interest rates and currency rates, and the incidences of default by borrowers in the relevant countries would significantly rise. If a nation's economy is fundamentally frail, its bankruptcy rules are lax, its insolvency processes are complicated, and it takes a long time to pursue a bank's legal rights in court, that nation faces a significant risk of bankruptcy. Country risk may also result from a nation's recent political upheaval, in which case the new administration may choose not to pay out on certain kinds of claims, including those made by foreign institutions. Furthermore, if a sovereign government is participating in an international agency's debt-rehabilitation program, the bank's exposure to that country is exposed to sovereign risk. The sovereign governments themselves may sometimes dispute their responsibilities and claim exemption from paying off foreign debts.

Transfer risk and currency risk are the two types of credit risk associated with cross-border exposures. A key element of nation risk is transfer risk, which mostly results from limitations placed on the use of foreign currency by governments owing to either a lack of foreign exchange reserves or a balance of payments issue. The lending bank incurs a loss as a result of the limitation or prohibition on the conversion of domestic currency into foreign currency, even if the borrower may be able to fulfill the contractual obligations in local currency. Currency risk is the term used to describe the losses incurred by the lending bank while converting the payment received from the overseas borrower in their home currency into foreign currency as a result of the domestic currency's value declining throughout the loan's term. If the overseas borrower is required to return the loan in foreign currency, the increased liabilities in local currency as a result of the unfavorable exchange rate movement might lead to payment default. Currency risk becomes credit risk as a result.

Risk of Transaction Settlement

Because one of the parties may fail to complete or settle the transaction in line with the agreed conditions, credit risk is a component of financial transaction settlement. One of the parties will suffer a loss that might be equivalent to the transaction's principle amount if one side of the transaction is resolved while the other side fails. Even if there is a delay in settlement, there is still a risk of loss since one of the parties would miss out on investment possibilities that

might have been taken advantage of if the transaction had been resolved promptly. The degree of credit risk on account of a failed transaction or a delayed settlement of the transaction is defined by the exact settlement arrangements. This kind of credit risk is a subset of "settlement risk." The timeliness of the exchange of value, the finality of the payment or settlement, and the function of intermediaries and clearinghouses are among the factors that regulate such agreements and have an impact on credit risk.

Since credit risk is produced by fluctuations in market risk components, credit risk and market risk are closely related. Depending on the bank's asset mix, one of these two risks will be more significant than the other. Credit risk occurs in both the banking and trading books and is made up of transaction risk, counterparty risk, and portfolio risk. The degree of credit risk connected to a given credit exposure often fluctuates over time since it is a dynamic notion. As a result of their connections to the affiliated units they hold, the variety of places where they do business, and the variety of credit facilities they get from various banks, it is difficult to identify the credit risk associated with exposures to multinational corporations. To collect credit risk from various facilities offered to major multinational firms at several locations, an integrated methodology is necessary.

For different loans and advances, the level of credit risk varies. It changes depending on the counterparty's characteristics, the goal of the loan, and the loan's maturity duration. Greater credit risk is associated with exposures to unregulated consumers, unproductive and speculative uses, and longer maturity periods. Banks need to be very aware of the credit risk that is present in their investment portfolio. Banks are highly vulnerable to credit risk when their investment portfolio consists mostly of unrated financial instruments.

There are numerous sorts of off-balance-sheet exposures that have full, medium, or low credit risk. Even though these off-balance-sheet facilities do not entail a cash outflow when the transactions are completed, the dilution of due diligence processes increases the credit risk. Since the underlying principal in derivative transactions is essentially notional, the credit risk associated with derivative products is often negligible. However, improper use of derivative goods by dishonest traders or a lack of operational staff supervision over the substantial usage of derivatives may result in large losses. It is important to identify risks throughout the whole derivatives portfolio.

According to their financial soundness or rating, banks should categorize their exposures to other banks and financial institutions into distinct risk classes and realize that there are different degrees of risk associated with exposures to each group of institutions. Intercountry exposures include some credit risk since a country's economic situation might change at any moment, a government could refuse to be held responsible for its international obligations, or there could be limitations on converting local money into foreign currency. Country risk, transfer risk, and currency risk are all products of cross-border exposures.

Concept and Applications of Credit Risk Ratings

A facility's or a counterparty's relative level of credit risk is expressed via the credit risk rating. The rating communicates the relative degrees of risk in terms of the probability of default for various kinds of exposures and counterparties, as well as the possible losses that are expected to occur in the case of default. The CRR framework captures the levels of credit risk in a granular manner. CRR quantifies the risk associated with each unique credit exposure and meaningfully distinguishes amongst counterparties based on the risk exposures they represent for the bank. The rating expresses the relative degree of safety inherent in an exposure, such as high safety, adequate safety, or low safety, and indicates whether an exposure entails high risk, moderate risk, or low risk. The ratings in a granulated rating system are often indicated by a mix of alphabets [5]–[7].

The major measure of the amount of credit risk the bank will take on should it take an exposure is the CRR. While CRR measures risk level, a credit risk measurement model (CRMM) estimates the likely amount of loan loss from the credit exposure or the portfolio. The two steps that make up the credit risk measurement procedure are these two instruments. The first step is the creation of a framework for grading credit risk, and the second is the creation of a CRMM for calculating the size of the loss. If the rating obtained via the CRRF is correct and accurately reflects the bank's actual risk assessment of the facility or the counterparty, the loss projected through the CRMM will be reasonable.

Uses of Credit Risk Rating

The main instrument for managing credit risk is CRR, which directs the bank in choosing wisely and intelligently how to spend money. Since the risk-grade position of all total credit exposures must be understood for credit risk management, the bank's risk

management philosophies, risk appetite, credit risk limitations, credit risk policy, and business strategies are all related to the concept of CRR. There are several ways to utilize CRR to improve the credit risk management procedure. The key areas where CRR may be utilized as a tool for improved credit management are highlighted in the following section.

Choosing Credit

A useful tool for choosing credits at the entrance point is CRR. The minimum criteria for credit selection, which will include the minimum rating of a borrower or a facility that will be accepted at the entrance point, should be outlined in the bank's lending policy. At various places, bank employees approve credits in accordance with the authority granted to them. According to the conventional lending approach, the evaluation of a borrower is somewhat reliant on a few subjective elements. Due to these arbitrary factors in credit evaluation, there is a chance that some borrowers may be unfairly selected. The assignment of a rating at the entrance point will, to a large degree, minimize the risk of choosing the incorrect group of borrowers and assure the caliber of credit selection at different levels of the business.

Risk Incremental Measurement

The bank's overall credit risk is dynamic and constantly changes in response to both internal and external economic events that have an influence on the bank. As vital as it is for the bank to understand the overall quality of its entire exposure, it is also critical to understand how the risk profile will change as a result of the addition of new customers or the approval of additional facilities for current clients. The CRR is a tool that aids in determining both the absolute risk and the incremental risk from new and additional exposures. The amount to which the bank's credit risk profile is altered by the addition of new clients depends on the credit risk scores given to them at the time of entrance. The amount of additional loss that may result from facilities approved to new customers will depend on the change in the risk-grade-wise distribution of overall exposures. The increased risk posed by new credit facilities approved for an existing borrower may also be quantified. Prior to estimating the amount of potential losses with respect to the existing facilities and the total of credit facilities after the approval of additional facilities, the rating should first be revised to account for the additional facilities granted to the borrower. The "incremental risk from additional exposure" will be the difference between

the potential losses from exposures before and after new facilities have been sanctioned.

The Exposure Limit Must Be Fixed

Banks set maximum exposure restrictions, referred to as "single exposure" and "group exposure" limits, respectively, for both individual borrowers and borrower groups. A collection of firms owned by the same promoters or operating under direct or indirect control of the same management is referred to as a borrower-group by banks. The maximum single exposure and group exposure limitations are often specified by bank regulators in terms of a predetermined percentage of the capital funds of the bank. Bank regulators impose a prudential restriction on the sum of significant exposures in addition to the single exposure and group exposure limitations. Banks must adhere to the set ceiling for the total amount of big exposures and define large exposure in respect to their capital funds. In establishing the exposure limitations, banks often exercise some degree of freedom within the boundaries set by the bank authorities. CRR may be a helpful tool in determining this flexibility.

Setting maximum exposure limits requires some flexibility in order to follow sound risk management procedures. The objective of the loans and the counterparty's risk rating may both affect how the exposure limits are set. There is a compelling argument for establishing different exposure limits for high-risk and low-risk borrowers. Banks may set risk grade-based exposure limitations for a single borrower and a borrower group by tying exposure norms to ratings. In a related step, the loan sanctioning authority of a variety of functions using client risk ratings. According to the premise of greater powers for low-risk rated clients and vice versa, loan managers may be granted variable powers dependent on the risk rating of the consumers.

Credit Concentration Analysis

Any kind of credit concentration may result in serious issues for a financial institution during times of economic downturn, market volatility, or changes in the macroeconomic fundamentals and can result in severe losses. However, a healthy amount of loan concentration in certain economic sectors may not always be dangerous. If banks have core competencies or specialty in the appropriate field, they may carve out a place for themselves in that market and build lending concentration to a certain degree. The degree of risk from concentration in any subportfolio must be measured using a technique in order to conduct an

accurate risk assessment of a bank's credit portfolio. One such crucial technique that may be trusted to assess the concentration risk is the CRR.

Every borrower in the credit subportfolio with concentration will have a risk rating assigned to them, which will affect the subportfolio's overall quality. The subportfolio may be regarded as healthy even with concentration if low- and moderate-risk exposures make up the majority of the overall exposure. A scientific analysis of each subportfolio based on ratings over time will reveal if any subportfolio has concentrations that might be harmful. The relative quality of each subportfolio will also identify potential areas for diversification if there is a pressing need for concentration dilution. When compared to volatile real estate subportfolios, subportfolios made up of loans given for the purchase of residential properties secured by a mortgage are seen to be low risk. Because most of these borrowers pose a minimal risk, banks often become specialized in the residential housing market. Residential home loans have a greater chance of being repaid since they are linked to fixed incomes like salaries or established businesses. The risk management process is more secure when CRR is used for portfolio review and concentration assessment.

Monitoring Risk Migratory

Banks must periodically assess the soundness of their credit portfolio. A portfolio review will show if the exposures in a certain subportfolio are becoming better or worse over time. The risk ratings given to the borrowers that make up a subportfolio are tracked over time at regular intervals, such as quarterly or semi-annually, in order to determine the portfolio quality. CRR is a technique for monitoring borrowers' rating migration. Risk migration will show if the amount of risk coming from counterparty exposures has gone up, down, or stayed the same over time. Rating upgrading, also known as a rating upgrade, and downgrading, sometimes known as a rating drop, indicate a smaller and larger potential loss, respectively, in the case of default.

Indirectly, migration analysis aids in cross-checking the CRR's correctness and integrity. According to CRR accuracy, under normal conditions there will be a progressive change in the rating given to a counterparty over a respectable length of time. The ratings given to the same counterparty over subsequent years won't vary in an unnatural way. Under normal conditions, there shouldn't be any rapid improvement or degradation in credit quality over the course of two or three subsequent years in the risk-grade distribution

of total corporate credit exposures. However, in unusual conditions, such as an economic collapse or strong market volatility, loans might suddenly become of worse quality. It is clear that the CRRF is flawed if a significant portion of borrowers who were initially given a low or moderate rating eventually fall into the default category over the course of one or two years in a healthy market. In this circumstance, a case-by-case investigation of the ratings is required, along with a review of the risk factors, scores, and weights utilized in rating calculation and any necessary adjustments to the CRRF. In essence, this serves as both a back-test and a validation of CRR. The CRR technique may assist the bank in enhancing the quality of its credit portfolios via the detection, progressive liquidation, and purchase of high- and extremely high-risk exposures [8]–[10].

CONCLUSION

In conclusion, financial organizations have difficulties due to the credit risk connected with derivatives, which calls for efficient risk management procedures. The key elements of reducing credit risk include a thorough credit evaluation, collateralization, diversification, and regulatory compliance. The resilience of the market as a whole and the stability of financial institutions are enhanced by proactive risk management in derivatives. In order to navigate the intricacies of credit risk from derivatives, ongoing attention to detail and adherence to basic risk management principles are essential. Ineffective credit risk management in derivatives might have serious repercussions. Financial institutions may suffer large losses, liquidity issues, and brand harm. Additionally, the contagion effect may extend via linked markets, impacting the stability of the global economy.

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Deciding the Loan Exit Point

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ABSTRACT: *Deciding the loan exit point is a critical aspect of loan management and risk mitigation for financial institutions. This abstract provides an overview of the loan exit point, emphasizing its significance, factors influencing the decision, and the benefits it offers to lenders. The loan exit point refers to the optimal timing and strategy for terminating or closing a loan. It is the point at which the lender determines that the loan has achieved its desired objectives, and further exposure to the borrower may carry excessive risks. Deciding the loan exit point requires careful consideration of various factors to ensure the lender maximizes profitability and minimizes potential losses.*

KEYWORDS: *Creditworthiness, Debt Service Coverage Ratio, Economic Indicators, Exit Strategy, Financial Analysis, Interest Rate Risk, Loan Maturity.*

INTRODUCTION

Banks tend to divide credit limits among themselves when counterparty exposures are high, either to minimize customer concentration or to lessen the severity of risk. Through loan participation or loan syndication, banks acquire stakes in significant risks. Most often, a prime lender or sponsor bank known as the "lead bank" will arrange for loan participation or loan syndication. The latter often bears the lion's share of the risk and keeps an eye on the borrowers' adherence to the loan's terms and conditions as well as their financial discipline. In reality, the credit proposal's due diligence is carried out and a risk rating is assigned by the sponsor bank or the prime lender. The assessments made by the lead bank are often accepted by the other institutions. But sometimes the banks that partake in the loan exposure also conduct their own independent credit proposal analysis. If the participating banks have in-house built credit risk rating models, they may rate the customer's level of risk and use the rating migration approach to monitor the exposure's health. The movements of the borrower's rating and the time frame in which a potential downgrade is expected to occur will be determined by the independent rating assignments made over succeeding accounting periods. A risk-sensitive bank will recognize the warning signs of a rating reduction, assess the exposure's quality in light of its risk management philosophy and loan sanction requirements, and leave the syndicate in time to prevent significant loan losses. CRR is a useful instrument that aids banks in determining the exit

points of both syndicated loans and loans where the bank serves as the only credit source.

Loan Prices Fixed

The kind and structure of the credit facility, the purpose, the length, and the type of counterparty all affect the credit risk to varying degrees. These many qualities are captured by the CRRF produced by the bank, which results in counterparty ratings or facility ratings. The rating communicates the relative likelihood of default associated with various risk classes as well as the amount of risk and the relative safety connected with a credit exposure. To be stable and go on with their business, banks must make up the losses brought on by borrowers' failure to repay loans and advances. According to the loan pricing principle, the price of any hazardous asset must take into account both a risk margin and the return on a risk-free asset. The risk margin must be sufficient to cover the bank's loss from risks that fully or partially materialize. Therefore, banks should establish standards for figuring out how much more money they should get from clients to cover the perceived risk. One customer's exposure might be riskier than another's. CRR assists in separating consumers based on relative risk levels and changing loan costs to reflect the differing levels of risk [1]–[3].

DISCUSSION

Measuring Business Performance

Banks act as sureties for consumers by lending money via direct credit lines, investments in bonds and debentures, and other means. Based on business planning and strategy, business capabilities, and risk-

bearing capacity, banks build up various portfolios. Evaluating the relative performance of several business lines is crucial for capital allocation and return on asset optimization. Comparing the risk-adjusted returns on the capital invested in various business lines is one approach to gauge how effective they are. The net return from a certain business line is stated as a ratio to the capital invested in that business line, and this is known as risk-adjusted return. In accordance with accounting standards, the bank may classify various operations and products under several business lines, and assess the success of each business line in terms of risk-adjusted returns.

Prior to calculating the risk grade total, all counterparties who have been granted credit facilities within a business line should first be given ratings. This will provide the distribution of overall exposures in a business line according to the bank's risk grading system. The possible loss that might occur for each business line should then be determined by calculating the prospective losses according to risk grade using the credit risk assessment models. To determine the relative profitability of each business line, the risk-adjusted net return on capital employed should be calculated using the possible loss associated with it as an input. However, different hazards connected to a business line's operations and goods are interconnected and cannot be managed in an isolated manner for efficiency measurement. To determine the relative profitability of a business line, it is required to account for the possible losses resulting from market and operational risks. The returns on capital invested in various business sectors, such as corporate finance, trade finance, commercial banking, and retail banking, where credit risk is a significant risk, can be calculated after adjusting for potential losses from credit risk and compared to determine relative profitability, ignoring potential losses that may result from market and operational risks. This will serve as a general benchmark for assessing business lines since there may be significant market or operational risks attached to a certain business line.

Making Loan Loss Reserves Valid

In compliance with legal requirements and accepted accounting principles, banks establish loan loss reserves. Typically, loan loss reserves and provisions against asset value declines are imposed at a minimum by bank authorities. The sum of three factors determines the minimal amount of loan loss reserve:

1. The loan's maturity date.
2. The worth of the security.

3. The likelihood of recovery as a proportion of unpaid debts.

Banks must keep two different kinds of reserves and contingencies, according to the authorities. Both generic loan loss provisions and loan-specific provisions. The general loan loss reserves act as an insurance policy against any future losses on loans. These reserves, which are computed as a predetermined proportion of the total loans and advances, are not set aside to cover known losses in any particular assets. On standard loans and advances, the amount of general loan loss reserves is often not reliant on the rating of specific counterparties or exposures. According to the New Basel Capital Accord, they are regarded as free reserves and may be included in Tier II capital. On the other hand, particular preparations are made to protect against a decline in the value of a subset of designated assets. General loan losses that later develop in the loan portfolio cannot be covered by special provisions for free, hence they are not eligible for Tier II capital inclusion.

Usually, throughout the course of a bank inspection, bank supervisors and bank auditors, both internal and external, evaluate the sufficiency of loan loss reserves. The benchmark used to determine if loan loss reserves are adequate is the ratings given to credit risks. The amount of exposure in each risk grade is determined by splitting total loans and advances into different risk categories. Consider how many exposures, for instance, are AAA-rated and how many are A, B, or C-rated. According to sound accounting principles, the general loan loss reserve, which is determined by using a set percentage of performing loans, must be less than the total projected losses from all loans and advances in the standard category. A useful instrument for confirming the general loan loss reserve is CRR. An evaluation of the decline in value of the identified loan assets is required to determine the sufficiency of provisions made against certain loan assets, such as problem loans, loans in the watch category, or nonperforming loans. Even in this case, the rating assigned in accordance with an internal rating system would produce the anticipated loan loss from a specific exposure and serve as the standard for comparing the sufficiency of provisions made after determining the fall in asset value. Thus, CRR approach aids bank management in establishing a methodical loan loss provisioning structure. CRR may be used as a tool by bank auditors and bank supervisors to confirm the sufficiency of loan loss provisions and reserves [4]–[6].

Principles for Rating Credit Risk

Banks use several internal risk evaluation models and rating methodologies. For evaluating various counterparties and exposure kinds, many models are available. A bank should "demonstrate to the supervisor that it meets certain minimum requirements at the outset and on an ongoing basis" in order to be able to use the Internal Rating-Based Approach for credit risk assessment, according to the Basel Committee on Banking Supervision. Many of these criteria take the form of goals that the risk rating systems of a qualified bank must achieve. The ability of banks to rank order and measure risk in a consistent, dependable, and legitimate manner is the main emphasis. These standards are underpinned by the fundamental notion that rating and risk estimation systems and procedures provide a meaningful evaluation of borrower and transaction characteristics, a meaningful distinction of risk, and fairly accurate and consistent quantitative estimations of risk.¹

Credit risk rating models may be developed internally by a bank or may be outsourced. In either scenario, the models must be founded on a set of minimal principles in order to pass the bank supervisors' acceptance test and be eligible for the New Basel Capital Accord's capital adequacy assessment. Owning their own rating models is advantageous for banks in the long term. The following paragraphs provide an overview of the basic guidelines that financial institutions should take into account when creating their internal rating models.

Differing Perceptions of Risk

When comparing the degrees of risk that various borrowers and facilities represent to the bank, the credit risk rating makes a distinction between them. Depending on the assessment, the exposures are classified as low, moderate, or high risk. In terms of default likelihood and loss rate given default, or in terms of risk weights to be allocated for regulatory capital evaluation, the variations in risk grades may be assessed. When compared to another risk grade, the differences between the two immediately preceding risk grades given to borrowers or credit facilities are expressed by a lower chance of default, a larger recovery factor in the event of a default, and lower risk weights for capital requirements. For instance, using risk grade A as the baseline, risk grade AA should have a lower default chance than risk grade A, and risk grade AAA should have an even lower default probability than risk grade AA. In the event of two favorable rating grades, the situation will be reversed. Risk grade BBB should have a greater default chance

than risk grade A, and risk grade BB should have a higher default probability than BBB. As credit quality deteriorates, the risk grades awarded according to the rating model should be sufficiently fine-grained to allow for meaningful differentiations in risk perception and risk quantum. The top management and market perception are that the probability of default is extremely low for such a customer under normal market conditions if they have been given the AAA rating by a bank, which denotes very low risk and is the best rating in its rating framework. If the transaction characteristics have also been taken into account in the computation of the rating, the loss rate given default will also be low. On the other hand, if a customer has been given a C rating the lowest possible rating in the nondefault category in a seven-scale rating framework, there is a high likelihood that they will default, and the bank will likely suffer a sizable loss as a result.

Characteristics of the Borrower and the Transaction in Rating

In the New Basel Capital Accord paper, the Basel Committee on Banking Supervision said that "a qualified IRB rating system must have two discrete and different dimensions:

- i. risk of default by the borrower, and
- ii. considerations particular to a deal

The first aspect of the rating system is that, except in certain predetermined conditions, successive exposures to the same borrower should be given the same risk grade regardless of the variations in the type and features of particular transactions. Various risk grades might be given to various exposures to the same borrower if nation transfer risk related to exposures in foreign currencies is involved or guarantee protection to a transaction is offered. But it doesn't seem like this Basel Committee exemption is a sensible idea. A borrower who defaults on one facility is likely to default on all facilities at some point in the future, and the bank has a general lien on all collateral against the total debt of the customer, so we may believe that it makes sense to assign the same risk grade to all of the borrower's facilities, regardless of facility-specific credit enhancement or risk mitigation characteristics.

The second aspect of the rating system is that the rating should take into account transaction-specific factors such the quantity and quality of collateral, the seniority of the creditors, or the kind of goods. The rating system's first dimension focuses on the likelihood that a borrower with a certain risk grade would default; the second dimension focuses on the level of protection

the bank would have in the event of a default. However, whether the facilities are provided at the same time or at separate dates, from the standpoint of risk management, it is incorrect to assign different risk grades to various facilities offered to the same client. It makes more sense to use a grading system that takes into account both borrower- and transaction-specific factors. When a borrower has received multiple credit facilities, it is preferable to evaluate the borrower's ability to service all of the credit facilities holistically rather than separately for each facility as obligations arise during the term of the facilities. It is better to use a credit risk rating that expresses the whole exposure risk to a customer rather than one that just considers the risk related to a specific facility. Even while facility rating is popular for choosing a certain facility, the bank must take the consumer as a whole into consideration.

Criteria for Ratings are Open

The New Basel's adoption of the "Third Pillar—Market Discipline"

One distinctive component of the updated framework is Capital Accord. The third pillar mandates that banks disclose their risk exposures and risk assessment methodology in both qualitative and quantitative ways. Banks are expected to offer a description of the internal rating process individually for five different portfolios in their disclosure framework as part of the qualitative disclosure on credit risk. The definitions, methods, and data for estimating and validating the probability of default, loss rate given default, and exposure at default, as well as any assumptions used in the development of these variables, must be included in the description.³ The rating system created internally by a bank must also include specific definitions of each rating as well as the factors taken into consideration when compiling ratings and assigning a particular rating grade to an item. In order for third parties or individuals who are not involved in the rating process to fully comprehend the mechanism of rating assignment and be in a position to assess the appropriateness of the ratings, the definitions and criteria should be recorded.

To ensure consistency in ratings for all borrowers and all facilities providing comparable risk to the bank, the rating criteria should be uniformly implemented throughout the company. To ensure consistency in the ratings made by various employees within the firm at various geographical locations, the information and inputs used in the rating process should be extensive. The rating criteria should be in line with the bank's

internal lending standards as well as its policies and processes for handling problematic loans or difficult clients. The grading system must, in essence, achieve at least the following four goals:

1. Application of the rating-compilation criteria consistently.
2. Clarity of each rating grade's definition.
3. Accuracy of the financial facts and information utilized in the grading.
4. The relevance of the rating's compatibility with internal lending norms.

The Credibility of Rating System

Credit approval is based on the rating given to the consumer. As a result, for the bank's senior management as well as the bank supervisors and auditors, the integrity of the rating process has enormous relevance. The rating method must adhere to at least two fundamental criteria in order for the ratings to be considered realistic and trustworthy. The rating grade given to a borrower by loan sanctioning authorities should, first, be reviewed by higher officials and updated often, and second, there should be an independent assessment of the rating procedure in place. Credit rules and underwriting practices must support and strengthen the rating process' independence.

A rating approval and rating endorsement procedure should be a part of the rating system's operation. Assigned ratings, especially those involving significant exposures, should be examined by individuals unaffiliated with credit sanction. The bank's lending operations and credit policy should both take into account the rating assignment and rating endorsement processes. In any event, ratings should be examined if certain changes occur that have an influence on the borrower's company and revenue. Ratings should be changed or endorsed at least yearly and ideally twice a year. When significant events occur, such as changes in the organizational structure, ownership pattern, or loss in revenue and collateral value, it is crucial to review customer ratings. Since information about borrowers' businesses and income is only accessible for a year, updating ratings on an annual basis is more accurate. Additionally, the yearly financial statements are trustworthy since clients are required to have the results reviewed by an external auditor at the conclusion of the fiscal year. More regular assessments of ratings should be conducted if the exposures are significant or fall within the high-risk category [6]–[8].

The date on which borrowers must publish financial statements and other information in accordance with stock exchange rules or other relevant legislation may be used as the reference date for reviewing counterparty ratings. If facility rating is also popular, the rating must be updated anytime market circumstances change since the value of collateral, the likelihood of default, the loss rate in the event of default, and the exposure to default are all impacted by the volatility of market risk factors. The accuracy and reliability of the credit risk rating process will be a key factor in determining the validity of the regulatory capital evaluation based on the internal rating-based approach. Additionally, the rating serves as a guide for the sort of follow-up steps a bank must take to control credit risks. The risk ratings given to borrowers are directly correlated with the breadth, intensity, and regularity of credit monitoring and follow-up. The monitoring of credit should be conducted more often and intensively the lower the rating grade.

Quantitative Risk Assessment

According to the Internal Rating-Based Approach for Credit Risk Estimation, banks' internal risk rating systems must achieve the fundamental goal of consistently estimating risks. By categorizing hazards into low, moderate, and high levels, the rating system communicates the danger. This is a generic way of thinking about risk; it does not represent the precise amount of danger in terms of low, moderate, and high hazards. For instance, if a client has a credit line from the bank of \$1 million and is given a risk rating of A, this merely means that the bank is at little risk. It does not specify the possible damage the bank may incur on the \$1 million exposure in the event that the client defaults. If historical information on the risk factors—namely, the chance of default, the loss rate given default, and the exposure at default—is available, the prospective loss may be estimated.

The bank must compile historical data on PD, LGD, and EAD for each rating grade and for each asset type in order to estimate possible loss from credit exposures. Each rating grade will reflect the amount of predicted loss that may occur on an exposure in the relevant asset class after the data have been compiled and confirmed via the back-testing and stress-testing processes. The amount of prospective losses may then be calculated according to the asset classes and risk levels. However, the completeness of the rating inputs and the consistency with which the rating standards are applied will determine how accurately the potential loss is calculated.

If two conditions are satisfied, the output generated by risk-rating models may be kept consistent. First, it's important to maintain consistency in the application of the rating criteria and establish impartiality in the calculation of the rating. Second, the rating model has to be suitable for the kind of commercial activity and the goal of the credit. As numerous people will be responsible for credit sanctions inside the firm at various geographical locations, consistency in model-generated output is crucial. The standardization of risk factors that are used to compile rating grades for various activities, exposure sizes, and purposes is one way to ensure the consistency and accuracy of ratings. On the other hand, the systematic development of norms for allocating scores in accordance with the extent and intensity of risks is another way to achieve these goals. Even if ratings will be produced by various people and in different places, the standardized risk criteria and scoring standards, which will be applied across the business, will result in the same rating grade for the same kind of borrower or exposure. To rate counterparties in foreign locations, the risk criteria will need to be appropriately updated. Credit risk assessment quantifies the inherent risk in credit exposures and meaningfully distinguishes between counterparties based on the amount of risk they represent to the bank or the relative degree of exposure safety. According to the rating principle, the likelihood of default decreases as rating quality increases. If a rating does not exhibit anomalous variances over a sufficient time frame under typical conditions, it is considered trustworthy. Through the application of CRR, banks may determine the entrance and departure points of loans, calculate the possible losses from extra and new exposures, and monitor the rating movement of borrowers over time. Through the use of CRR, they may evaluate loan concentration, set exposure limits, and assign loan sanction powers in accordance with the risk profiles of counterparties. Banks may utilize CRR to establish loan pricing, assess the effectiveness of various business lines, and calculate the amount of loan loss reserves and provisions. Due to variations in counterparty and facility characteristics, banks may use different models and methodologies for rating. Due to the fact that counterparty ratings are more significant than facility ratings, the bank should include both transaction- and borrower-specific criteria in its rating approach.

It is incorrect to give various services offered to the same client different risk ratings. A risk assessment that expresses the whole risk of exposure to a client is

safer than one that just considers the risk connected to a specific facility. As credit quality deteriorates, risk categories in the rating framework should be so finely divided as to allow for significant distinctions in risk perception and risk magnitude. If bank supervisors and external auditors are to accept the CRR framework, the criteria for rating assignment must be clear, applied uniformly throughout the organization, and the integrity of the rating process preserved. The New Basel Capital Accord stipulates that the risk rating system created by banks for the estimate of credit risk must achieve the fundamental goal of consistently measuring risk. Standardization of risk variables and scoring rules may be used to ensure uniformity in rating assignments [9]–[11].

CONCLUSION

In conclusion, A key component of loan management for financial organizations is determining the loan departure point. Effective decision-making depends on thorough analysis of borrower creditworthiness, market circumstances, loan-specific considerations, and pro-active risk management techniques. Strategic loan exits provide lenders the flexibility to control credit risk, optimize their loan portfolios, and keep their finances stable. Successful loan exit plans depend on ongoing evaluation, quick decision-making, and monitoring. Financial institutions should set up adequate loan monitoring and risk assessment processes in order to select the loan departure point. Clear loan exit criteria should be established and implemented consistently, including review and action triggers. Identifying prospective loan departure opportunities and assessing the potential effects on the institution's overall risk profile may be aided by regular portfolio reviews and stress testing.

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A Brief Discussion on Credit Risk Rating Issues

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ABSTRACT: Credit risk rating is a fundamental component of risk management in the financial industry, providing a standardized assessment of the creditworthiness of borrowers. However, credit risk rating processes are not without their challenges and issues. This abstract provides an overview of the key issues surrounding credit risk rating, highlighting the importance of accuracy, transparency, and robust methodologies. Accurate credit risk rating is crucial for financial institutions to make informed lending decisions, set appropriate pricing, and manage credit risk effectively. However, several issues can impact the reliability and effectiveness of credit risk rating systems.

KEYWORDS: Credit Rating Agencies, Default Probability, Credit Risk Assessment, External Factors, Financial Statement Analysis, Industry Risk.

INTRODUCTION

A rating reflects the potential loss the bank may experience if the borrower commits default in fulfilling its obligations and serves as a concise indication of the risk involved in credit exposure. The amount of loss is never constant since changes in the political, economic, and market environments affect the default likelihood and the severity of the loss over time. It is challenging to create a credit risk rating framework that will be equally applicable to all kinds of banks and borrowers. When it comes to structuring the construction of credit risk assessment models, financial organizations have different practices. In order to learn more about "best practice" and "sound practice" in the development of internal rating systems, the Models Task Force of the Basel Committee on Banking Supervision conducted a survey of roughly 30 banks in G-10 nations in 1999. It was determined by the committee 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." Generally speaking, the credit risk rating system shared characteristics among banking institutions in terms of the types of risk factors considered for risk compilation, the assignment of ratings based on the evaluation of the counterparty, and the use of ratings for various aspects of risk management. The primary area of variation was discovered in the procedures banks used to compile data on loss characteristics for each risk category. According to the poll, banks typically took into account the same kinds of risk

criteria when determining a rating, albeit there were some differences in the relative weighting and combination of the quantitative and qualitative risk variables. Regardless of whether the rating was to be awarded to the borrower or the facility, banks conducted an overall evaluation of the counterparty. The same objectives limit setting, loan pricing, and management reporting were also primarily served by ratings [1]-[3].

The Rating Framework's Design

It is vital to address a few concerns related to the rating process before designing a realistic rating structure. The CRRF shall, first and foremost, conform to the standards established by the Internal Rating-Based Approach of the New Basel Capital Accord for the evaluation of regulatory capital. The New Accord enables banks to use domestically created models for capital assessment to cover credit risk more often. The rating created by the CRRF should take into account the varied degrees of risk associated with each risk grade and provide the bank the ability to map risk weights to the various risk characteristics. It will be easier to compile risk-weighted assets for the computation of the capital charge for credit risk if the counterparty has ratings and risk weights allocated to each risk grade. The bank supervisory authority should support the CRRF's dependability and validity and vouch that it produces acceptable ratings for accurate credit risk evaluation.

The CRRF should provide a way to determine the loss characteristics linked to each risk grade, which brings up the second problem. The framework should allow the bank to monitor the change in rating and provide information on the likelihood of default for rated borrowers within the specified time range. The

historical data on risk components that may be used to calculate anticipated losses and unexpected losses for the evaluation of economic capital should be compiled using the risk grades specified in the CRRF. The CRRF shouldn't operate negatively and obstruct the bank's process of expanding its credit, which brings us to our third concern.

This may occur if the rating criteria are unfeasible or too gloomy and pessimistic assessments are made of the risk elements that are considered throughout the rating process. The CRRF is not meant to take the place of the bank's customary loan assessment procedure. Instead, the rating need to be considered as an extra instrument for making lending choices. Because banks have different perspectives on the relative weighting of the risk elements that go into a rating's formulation and the relative proportion between the quantitative and qualitative risk components, there is no consistency in approach when it comes to the building of rating models across banks. Whatever method is adopted, the internal rating system set up by the bank should generally comply with the IRB approach specifications outlined in the New Basel Capital Accord.

The following main factors affect how an internal credit rating system is designed and run:

1. Problems with concepts.
2. Developmental problems.
3. Problems with the execution.

To ensure that the rating process runs effectively across the company, banks must fully comprehend and address these concerns. The system should be simple to use, and the personnel handling credit should be aware of the significance of the rating. The bank must make sure that the rating system is used consistently by all employees, regardless of where they are located. The end product should be identical, with everything else staying the same. The following paragraphs provide a quick analysis of these topics.

DISCUSSION

Conceptual Issues

Choice of Approach for Risk Factor Selection

The first conceptual difficulty has to do with the method used for identifying risk elements in order to calculate the credit risk rating. There are two methods of rating: the "through the cycle approach" and the "current condition approach." The two vary in that they use a different time horizon for the selection of risk indicators that are used in the CRR calculation. Should we take into account risk variables that might

occur over a much longer time horizon or calculate CRR based on present risk factors?

The health of the economy has a significant impact on the financial system's stability, and when macroeconomic instability occurs, the system is more susceptible. It is difficult to forecast how often trade cycles will occur in an economy. However, it is difficult to predict when the depression phase is likely to start in an economy or how long the depression phase will endure. Banks suffer during the depression or recession phase of the trade cycle. Along with the erratic timing of trade cycles, other important variables include the cycle's strength and spread. When a slump begins, it need not always effect the whole economy; it might just hit one or two sectors, such as the steel, real estate, or car industries [4]–[6]. Due to correlation, there may be some spillover effects between certain industries. Due to a drop in sales and earnings, industrial and trade businesses that have taken out loans from the banking system suffer during a depression. The declining trend in their business activities has an adverse effect on cash inflows and reduces their ability to repay loans. Default probability rise and collateral values fall throughout the recessionary period. The question that has to be thought through in this situation is how to account for the economic downturn's occurrence in the risk-rating procedure due to various obstacles.

The first issue is that the "through the cycle" method and the "current condition" approach have different criteria for choosing risk variables for rating. Although the standards used by the international credit rating agencies are opaque, it is assumed that they typically adhere to the "through the cycle" concept, which takes into account the borrower's expected condition in a scenario with a weak economy. The worst case scenario, also known as the "bottom of the cycle scenario," or very stressful circumstances, are used to analyze the borrower's financial status. According to the danger that is now present, a risk grade is given. However, the ratings given by international credit rating agencies primarily apply to large corporations or multinational businesses operating in developed economies with significant financial and capital markets, and they need not always be appropriate and reliable, as was demonstrated by the incorrect ratings given to mortgage-backed securities that were quickly downgraded and contributed to the financial crisis.

Financial crisis in the US in 2007. In any event, it makes sense to believe that big enterprises, which are more resilient to economic shocks, are the ones for whom the "through the cycle approach" is more

pertinent. Small and medium-sized businesses, which make up the majority of bank customers, may not be rated using this method because they have a low tolerance for economic shocks and may not be rated using too strict criteria, even though their projects and businesses may be financially viable. The present condition technique seems to be better suitable in these circumstances. However, if rating standards are clear and dependability is supported by actual data, the ratings provided by external organizations are useful and may be accepted. Banks may employ their own internal nation risk ratings for foreign counterparties as well as other publicly available data, and they may change the ratings from external organizations as needed.

The second issue is that the economic slump could not occur in a clear cyclical sequence. Instead of a decline in the demand for products and services, market-related forces may have manufactured the collapse. It could just affect one or two economic sectors. The Asian financial crisis has shown that credit and market risks are strongly correlated. The real estate decline marked the start of the financial crisis, but the economic unrest grew as a result of the erratic nature of market factors. The recession did not follow the historical pattern of economic cycles. As a result, it is difficult to predict when trade cycles will occur, to generate clear opinions about the features of the cycles, and to pinpoint risk variables that may be taken into account during the rating process.

According to research done by the Basel Committee on Banking Supervision's Models Task Force in the spring of 1999, banks often use a point-in-time or "current condition approach" to assess the risk of a borrower or a facility. However, the poll has shown that banks take into account all pertinent aspects when assigning ratings, including those that are pertinent from a long-term viewpoint. However, banks do not significantly depend on long-term predictions that demonstrate increases in the borrower's repaying ability over time in order to award a good rating. Instead, banks take into consideration longer-term unfavorable prospects even under the "current condition approach" for risk assessment.

In light of the findings, banks should avoid focusing too heavily on the time horizon when deciding which risk indicators to include in their internal credit risk assessment models. Consideration should be given to all relevant and accessible facts and information at the time of grading, including any eventualities. For the majority of clients, the "current condition approach" is more appropriate.

Selection of Rating Dimension

The relative safety of credit exposures is shown by the risk rating. For the approval of a specific facility, some banks look at the "facility rating," while others look at the "counterparty rating" for the approval of any kind of credit facility. Contrary to counterparty rating methodology, which incorporates borrower and facility attributes, facility rating methodology has primarily focused on facility features. Some banks determine the counterparty rating initially without taking facility features into account, and subsequently they change the rating by adding facility characteristics like guarantee protection and collateral coverage. It is not suitable to draw a conclusion about which approach is safer in the absence of empirical information about the degree of association between credit choices based on facility-rating and borrower-rating on the one side and the occurrence of credit defaults on the other side.

Credit facilities are extended by banks using a variety of formats and naming conventions. Borrowers may choose from a variety of fund-based and non-fund-based credit facilities offered by one bank or many banks. The fund-based facilities come in the form of fixed-term loans, overdraft or cash credit lines, trade bill discounts and purchases, or subscriptions to corporate bonds and debentures that are credit substitutes and have a set redemption period. The non-fund-based facilities are often provided via the underwriting of stocks and bonds, financial guarantees, and import and export letters of credit. If the borrower uses just one kind of facility from one bank, it could be feasible to base lending choices on facility rating. However, relying only on a facility rating when borrowers request several credit facilities from different institutions is not advisable. The second approach, when the bank offers a facility by subscribing to bonds or debentures issued by the counterparty, is significant. Since the borrower is responsible to the bank for the total debt and not facility-specific debt, it is not practical to rely on facility ratings if the borrower needs a package of credit facilities. This is because different facilities may receive different rating grades, even though they relate to the same customer. Additionally, owing to the various features of facilities, calculation of ratings for various facilities may not demonstrate consistency across ratings. If the borrower contacts several banks for approval of various loan facilities, the issue becomes even more problematic. Due to bank-specific preferences and eccentricities, various banks may have distinct rating criteria, rating scales, and rating models

that are not always comparable. It makes more sense to focus on borrower rating rather than facility rating in light of these complexities and the potential for larger variance in facility ratings. Since the money held in different accounts is fungible and the borrower has the option to move the money between accounts and locations, or it may manipulate the accounts to stifle undesirable developments, the borrower rating is really more important than the facility rating. A facility's default does not happen in a vacuum; rather, default in any one of the facilities often happens when the borrower's total financial situation worsens. Even facility rating is not done in a vacuum; risk aspects reflecting borrower characteristics are among the risk variables taken into consideration.

Adoption of the Default Definition

The probable loss that might occur in the case of default is indicated by a credit rating. Therefore, a definition of default must be established while creating the design of a CRRF. We always associate a rating, such the AA rating, with the likelihood of default when we give a credit exposure a rating. As a credit analyst, we aim to express that the default rate for credit assets in the AA category is low and lower than the average default rate for the bank as a whole. The incidences of defaults in different asset categories serve as the foundation for the granulation of the rating scale. As a result, while structuring the architecture of the CRRF, the notion of default gains great relevance. Whether evaluating whether a credit exposure has reached the stage of default, banks, as well as bank regulators and supervisors, may not always use the same procedures. Even the Basel Committee on Banking Supervision has granted the bank supervisors considerable latitude to use their judgment in defining loan default while taking into account the specifics of local situations.

The legal definition of default and the term used by bank regulators are the two main meanings of default. The concept of default used in credit risk rating models may not be the same as the meaning used in law. The basic definition of default is the debtor's violation of their contractual duties to the creditor. When a debtor is unable to fulfill all of his or her financial commitments to creditors by the specified dates, default occurs. In other words, the debtor's financial obligations everywhere in the globe are included in the scope of default. The default has happened if the debtor voluntarily asks a court of law to declare him or the businesses he owns insolvent, or if creditors sue a debtor in a court of law to have him or his businesses declared bankrupt and the court accepts the petitions.

The procedure may sometimes be delayed since different nations have different bankruptcy rules.

The definition provided by bank regulators is clear and concise. According to their definition, a default occurs when a debtor fails to make a full or partial payment of his obligation to a creditor in accordance with the terms of the agreement within the allotted time period starting on the day the debt is due. However, the definition of the supervisors varies throughout nations, mostly because of the varying prescriptions for the time period that may be given as a concession to the debtor to return his obligations. The time frame is often connected to the cycles of production, revenue creation, and trading patterns that differ across nations [7]–[9].

According to the New Basel Capital Accord, default means:

When one or both of the two occurrences listed below happen with respect to a certain borrower, a default is deemed to have happened:

- i. The bank believes it is doubtful that the borrower would fulfill its credit obligations to the banking group in full without the bank taking further measures, such realizing security.
- ii. Any significant debt the borrower owes to the banking group is more than 90 days past due. Once a client has exceeded a limit that has been disclosed to them or has been informed that a limit is lower than what is now outstanding, overdrafts will be regarded as past due.
- iii. Bank supervisors may, at their discretion, extend the 90-day time limit for retail and public sector entity commitments up to 180 days to accommodate local circumstances.

Additionally, the paper has listed a few events or components that will aid bank management in determining if a default has occurred in relation to a credit exposure.⁴ These events or components are:

1. when a bank stops charging interest on a particular account in accordance with sound accounting principles or accepted accounting procedures.
2. when a bank reserves money for an account because credit quality has deteriorated.
3. A bank makes a financial sacrifice when it sells at a discount the credit exposure or restructures the loan.
4. when a bank submits a petition for insolvency or bankruptcy to a court of law or another appropriate body.

5. when a borrower applies for protection under the bankruptcy or insolvency rules in order to postpone or avoid having to repay creditors.

An essential component of the grading process is the definition of default. When establishing the architecture of the CRRF, it is preferable to adopt the extremely precise definition of default provided by bank regulators and supervisors. Except in extraordinary circumstances, if a borrower who was rated AAA at the entrance point defaults on the repayment obligations within a year or two, the bank's internal risk assessment model is unreliable.

Evolutionary Concerns

Choosing Risk Factors

A bank must create its own rating models while taking its asset profile into consideration. The risk variables used to calculate ratings are the main inputs. The bank must carefully determine the risk characteristics that will apply to various counterparty types and facility kinds. Since these are essentially the same elements that bank officials often take into account while conducting the due diligence process for loan approval, it is not straightforward to determine the risk factors for rating compilation. According to the conventional credit analysis technique, the bank evaluates the risk in its entirety based on a series of findings from a thorough examination of the project's technical and financial viability. The evaluation of the borrower's ability to repay under both regular circumstances and pressure scenarios is the main concern. The typical credit analyst takes into account all potential hazards up till the debt is repaid while doing this. Similar risk considerations are taken into account when calculating a rating, but in a more organized manner. The distinction is that risk variables are given numerical values only after the severity of an emergent risk has been evaluated. Subsequently, the numerical values are summed to provide a rating that represents the degree of risk associated with an exposure. Both the classic credit analysis approach and the rating system involve risk criteria, most of which are similar. Typically, conservative banks don't make credit choices entirely based on ratings. After thorough consideration using the conventional credit assessment approach, they employ risk rating as an extra instrument to reach a decision on a loan. The effort in due diligence is not replaced by the risk rating.

Level of Detail in Rating

The many applications of a granulated grading scale were covered in Chapter 8. But how granularly should

ratings be broken down? If we do not move beyond the binary categorization of loans into good and bad loans, risk management techniques and alternatives will fall short of the need. To get around the drawbacks of general loan categories, risk ratings are granulated. Granulation aims to provide accurate and reliable credit risk models for credit loss estimates. The following are the most crucial features of granularity in risk grade:

1. The user is aware of the full significance of a given risk rating.
2. Each grade is a series of judgments about the relevant counterparty.
3. Every grade reflects the likelihood of default risk connected to the exposure.

For instance, a banker who makes loan choices based on ratings should be able to grasp quickly that a counterparty with a AAA rating belongs to the lowest risk or maximum safety category. If the counterparty receives a AAA rating, the following set of conclusions should be supported by the rating:

1. The counterparty is a stable financial entity.
2. The counterparty is very resilient in challenging conditions and turbulent markets, or is least vulnerable to mild business losses.
3. The counterparty has a very high chance of surviving an economic downturn.
4. With regards to exposures in the AAA category, the incidence of default is very low—between 0.5 percent and 1 percent of borrowers.

Size of the Risk Grades

How many risk categories should a bank include in its internal system for evaluating credit risk? In this aspect, international approaches diverge. In order for the grades to accurately represent the small differences in risk perception, the rating system must include a minimum number of risk grades. The Basel Committee has advised 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," according to the New Basel Capital Accord. A bank must have a minimum of seven non-defaulted borrower grades and one default borrower grade in order to achieve this goal. Supervisors may mandate that banks have a broader variety of borrower grades if they lend to borrowers of different credit worthiness.

The rating scale must provide enough risk levels for the bank supervisors and external auditors to be able to assess the relative quality and stability of the bank's credit portfolio. Typically, bank authorities leave it up

to the banks to choose how many grades to include in the rating system rather than dictating the precise amount. However, the regulators anticipate that banks will adhere to the IRB approach's standards. The number of rating grades should not be increased beyond a certain point by banks since it may not result in any further benefits. The procedure of gathering the data and information for fine-tuning the risk grades and running the rating system would be more costly and time-consuming the more rating grades there are. Several variables affect the amount of risk grades that may be included in the rating system.

The following elements should be considered by banks when assessing the realistic number of risk grades:

1. Policy for credit risk management.
2. Appetite for credit risk.
3. Credit history.
4. Specialized credit spreads.
5. Policy of provisioning for bad loans.
6. Banking industry customs in your area.
7. Best practices used worldwide.

The following are the main goals for providing a sufficient number of risk grades in the rating scale:

1. To evaluate capital needs in accordance with various risk characteristics by allocating counterparties with the appropriate risk weights.
2. To identify the creditworthiness of one loan from another.
3. To compile historical information on risk factors.
4. To calculate possible losses from exposures of various credit ratings.
5. To establish a reliable loan pricing methodology.
6. To assess the credit profile's general health.

Finding issue loans or loans in the watch category is another crucial goal. A distinct grade for "watch category loans" is necessary from the perspective of credit risk management for careful monitoring in order to prevent the slipping of standard category loans and advances into the nonperforming category. It is also necessary to segregate ill category loans into a different grade in order to identify the industries or enterprises of borrowers before they become sick, allowing for the creation of restructuring or rescheduling plans at the proper moment.

For relatively minor exposures, personal loans, or agricultural loans, the grading system should be flexible enough to allow institutions to have fewer classes. Banks may utilize extremely fine granulation when evaluating big exposures, causing risk grades to fluctuate or migrate as a result of even minor changes to the key financial ratios used in the rating process. Even changes in the lending environment should be

able to be taken into account by the rating procedure. The grading system's ability to accurately represent the differences in default probability connected to various risk ratings serves as the final test of its robustness. If the credibility of the rating grades is to be accepted, the percentage of loans going bad in each risk grade within a chosen time zone as seen from real instances in the bank's records must be close to the model-generated default probability [9]–[11].

CONCLUSION

In conclusion, Issues with credit risk ratings make credit risk assessment procedures less reliable and less effective. For accurate and transparent credit risk evaluations, subjectivity, complexity, data quality, and overreliance must be addressed. Financial organizations and rating agencies may improve their methods for assessing credit risk and fortify overall risk management by implementing strict methodologies, encouraging openness, and taking a wider variety of risk variables into account. Financial institutions and rating agencies should emphasize openness, use solid risk models, and invest in data quality and analytics skills in order to successfully solve credit risk rating challenges. Stress testing, scenario analysis, and independent validation of credit risk rating models may increase certainty and improve risk management procedures.

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A Study on Determination of Rating Scale

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ABSTRACT: The determination of a rating scale is a crucial step in credit risk assessment, providing a standardized framework for evaluating the creditworthiness of borrowers. This abstract provides an overview of the factors and considerations involved in the determination of a rating scale, highlighting the importance of accuracy, comparability, and relevance in credit risk analysis. A rating scale is a hierarchical system that assigns credit ratings or scores to borrowers based on their creditworthiness. The rating scale facilitates the communication and understanding of credit risk across different stakeholders, such as lenders, investors, and regulatory bodies. The determination of a rating scale involves careful consideration of various factors to ensure its effectiveness and reliability.

KEYWORDS: Default Probability, Internal Rating Models, Issuer Credit Ratings, Numerical Scales, Rating Categories.

INTRODUCTION

The grading scale should account for all potential loan statuses in terms of the likelihood that they will become in default and the degree of recovery in that case. What's crucial is that a bank should provide certain standards for determining a given risk level. Each grade should be able to be distinguished from another grade in terms of the severity of default probability and should express the level of default risk associated with the borrowers in that grade. For instance, a borrower rated in grade 1 on an eight-scale framework for assessing borrowers has almost little risk and the lowest chance of default, while a borrower rated in grade 7 has the greatest risk and the highest possibility of default. The bank is guided by the calibration in the rating grade when determining the collateral package and other terms and conditions for loan approval in line with the various risk scales [1]–[3].

Rating Interpretation

Credit ratings provide the most recent assessment of a counterparty's creditworthiness and financial stability in respect to all of its financial commitments. The capacity and willingness of the borrower to fulfill specified financial obligations on loans, overdrafts, bonds, commercial papers, etc., are expressed in the borrower's ratings. Different rating ratings reflect varying probability of defaulting on repayment commitments as well as varying degrees of safety.

Issues with Implementation

Credit risk rating models must be implemented universally across the firm using the proper processes.

The implementation of the rating system presents a number of difficulties for large banks since they operate in several foreign countries and have a wide network of domestic branch offices.

To solve the common obstacles banks have while applying the risk rating models throughout the enterprise, a few concerns must be resolved. Choosing the rating coverage is the key implementation challenge. deciding on the procedures for starting and finishing the rating process. establishing homogeneity in rating output and ensuring impartiality in rating. establishing measures to prevent conflicts of interest between loan decisions and rating assignments. fixing accountability for conducting a separate audit of ratings that have been given. establishing internet connection, storage, and retrieval of borrower data for monitoring and control personnel.

Coverage of Ratings

The credit assets of a bank are made up of loans and advances of various quantities made to various counterparties with various objectives and terms. Since size-based categorisation of exposures has its own drawbacks, the credit risk management concept requires that all exposures be graded regardless of size. Short-term exposures in large sizes may be less dangerous than long-term exposures in medium sizes. If not all exposures are graded, the approach of managing credit risk will be insufficient. Due to the volume and expense of rating, banks with a substantial proportion of small borrowers may not find it practicable to evaluate all small loans and instead choose to assess all loans that exceed certain thresholds. The cutoff limits may vary in terms of counterparty, purpose, and duration and are influenced

by the bank's risk management strategy, the average exposure size, and the number of loans falling into certain ranges of limit amounts. Without exposing them to individual grading, the small loans that fall under the cutoff limitations may be sorted into homogenous groups and given fixed ratings. However, if the idea is to be accepted, the assignment of fixed risk ratings to pools of small loans must satisfy at least two requirements. The assigned rating for the asset pool must show default probability and loss given default characteristics that are nearly identical to those that would have been determined if individual ratings of these loans had been conducted. The second criterion is that these small loans' risk weights, which will be allocated to them collectively for the purpose of calculating regulatory capital, must adhere to the guidelines set out by the New Basel Capital Accord and the bank supervisory body.

DISCUSSION

Rating Approval Process

To produce the final outcome, the rating approval procedure must go through three steps. The front-line personnel, relationship manager, or branch office manager who interacts with the potential borrower starts the rating process in the first step by gathering information and initiating it. It will be useful if the loan application forms are created in such a way that they include all the information in one place, both for rating and for loan processing. The compilation of rating involves various pieces of information and data on potential borrowers.

The second step involves data processing for the purpose of rating derivation, and the third stage involves rating approval and adjustment as necessary. The organizational structure and the decentralization of loan sanction authorities will determine the choice of authority for rating compilation and approval. If certain minimal checks and balances are maintained, borrower rating may be conducted at the bank's branch office without jeopardizing the idea of separating the operational function from the control function. At all administrative levels, a bank with a three-tier organizational structure a branch office, a controlling office, and the head office can be responsible for rating approval. Depending on the organizational position of the authorities, each tier may be given duties up to certain boundaries. Applying the premise of the next highest authority for risk rating approval appears more acceptable. If the branch office manager creates the rating, it must be authorized or updated by the regional

manager, who serves as that manager's governing authority. But if the ratings given to every borrower at the branch offices have to be confirmed by the next higher authorities, the effort would be massive for a bank of big size, having a few thousand branch offices and a large number of borrowers. Practically and realistically, it is possible to delegate the authority to approve the credit risk rating of borrowers to the officials in charge of sanctioning loans at various administrative levels, subject to a sample-based review by the next higher authority. This kind of setup will need to be put through a surprise audit process on a regular basis, reinforced by a strict penalty mechanism for intentional misconduct. Although the branch office will start the rating process for extremely substantial exposures to various asset classes, a committee of top executives should have ultimate approval on the rating [4]–[6].

Review and Rating

To make credit risk monitoring effective and relevant, ratings given to borrowers should be evaluated on a regular basis. Ratings should be reviewed whenever loans are extended or new loans are approved for an existing borrower, whenever fiscal, industrial, export-import, or regulatory policies change, or whenever significant alterations to the affairs or financial records of a specific borrower or borrower-group are discovered. When circumstances pertaining to the borrower change, the personnel in charge of approving risk ratings within the company are often in charge of reviewing and revising the risk grade.

Rating Output Reliability

How to maintain consistency and uniformity in rating output is a crucial implementation challenge since it is completed by many individuals in various places across the firm. Even if the data and information base is the same, rating grades given by various individuals in different geographic places may change in regard to the same or a comparable kind of borrower. This is due to the fact that rating is a synthesis of subjective and objective evaluation. If subjectivity is reduced and objectivity is improved, rating accuracy may be assured. The term "uniformity of rating output" refers to the rating methodology's ability to provide the same rating for the same or a related class of borrower, even when performed by different people in various places. By creating standards for scoring risk factors, documenting the requirements for awarding a rating grade, and familiarizing the field employees who conduct the rating with the rating methodology, it is

possible to ensure the objectivity of the rating and consistency in the assignment of the rating grade.

Rating Conflicts of Interest

To prevent conflicts of interest, it is important to keep in mind the general idea of separating the risk rating function from the credit sanction function while implementing the rating process. But for banks with a vast network of branch locations and a broad customer base, it might be challenging to uphold this philosophy. Since small loans are numerous and dispersed throughout a vast network of branch offices, it is nearly difficult to adhere to this approach. When big and medium-sized exposures account for a significant portion of the entire amount of credit, this concept must be scrupulously followed. While the actual loan sanction should be the responsibility of the bank's board of directors, managing director, or a committee of senior management in accordance with the loan approval policy, 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. The credit personnel involved in the loan sanction process might be given the authority to initiate and approve ratings for loans up to the stated limits, subject to the necessary checks and surprise audit.

Independent Examination of Given Scores

A few issues arise from the borrowers being assigned risk ratings. Rating affects not only the loan decision but also the lending rate and the package of collateral. Loans with a low risk rating get a lower interest rate and a softer collateral package. As a result, it is possible to manipulate ratings for one's own benefit or to surpass goals by using favorable evaluations. Along with the rating review and rating modification systems, banks should implement a system of independent rating verification by employees unrelated to the loan sanction and loan administration processes. The internal audit team may be regularly entrusted with the independent verification of ratings given to borrowers. In contrast to outside agencies, the internal audit team is a superior option since it guarantees continuity and safeguards the privacy of the borrower's accounts. In addition, the internal audit team is more account to the top management.

Data Retrieval and Storage

Bank employees at various levels manage the financial data and other information about potential borrowers that is needed for grading. Any step of data corruption might result in rating inaccuracies. Additionally, the

data may be changed to provide a higher rating grade, which has an impact on credit quality. Data integrity must be protected, and access to data must be limited to authorities throughout the company. At regular intervals, people unrelated to the risk rating or credit sanction functions should submit the data input into the computer system at the branch office or the front office to selective scrutiny. Since risk weights for regulatory capital assessments are aligned to the various risk grades obtained through internally developed models, and capital relief is available on the value of admissible collateral, this verification process assumes greater significance if the bank intends to adopt the IRB Approach for credit risk assessment prescribed in the New Basel Capital Accord.

Checks on data input and data accessibility may help to safeguard the reliability and correctness of ratings. Verification will also be required of the collateral's specifics, which are used in the rating process as risk mitigation inputs and provide relief from capital requirements. The second concern is the internet connection and preservation of data and information on all borrowers. To manage credit risk, it is important to create a risk-grade-based breakdown of the bank's overall credit exposure at any one moment. Real-time data retrieval necessitates the daily input of information on arriving and departing borrowers into the computer system as well as online connectivity between branch offices, controlling offices, and the head office. Only the authorized workers at different levels of administration should have access to the whole set of data relevant to credit ratings and credit sanctions.

Due to the unique quirks and preferences of each bank, as well as variations in rating criteria, rating scales, and rating models, the credit risk rating technique differs amongst financial institutions. Banks may employ internal rating models for monitoring borrower rating migration, generating risk grade-specific loss characteristics, and quantifying possible losses based on risk grade.

Banks should use internal model-derived ratings as an extra tool for credit decisions rather than as a replacement for due diligence. In order to prepare the design of the rating framework, banks must address a number of conceptual, developmental, and implementation difficulties. Determining the window for choosing risk variables, selecting between facility and counterparty ratings, and adopting the default definition are all conceptual challenges. For grading the majority of consumers, the "current condition approach" is better than the "through the cycle

approach." It is recommended to rate borrowers rather than facilities since the latter may result in various rating grades for facilities even when they are related to the same borrower. There is a chance that facility ratings may differ much further.

Identification of risk factors and setting of the number of grades in the rating scale are related to developmental difficulties. The grading scale should accurately reflect the changes in default characteristics linked to each risk grade and include all plausible loan situations in terms of their likelihood to transition to a default state. The rating administration procedure, rating approval, and rating coverage are all implementation-related challenges. Loans that are more than certain cutoff limits may only be appraised individually from a cost and convenience perspective. Small loans that fall under the cutoff limitations may be categorized into similar groups and given conservatively predefined ratings. By generating standards and scores related to risk aspects and establishing clear criteria for giving grades, it is possible to ensure consistency in the assignment of rating grades by various employees at various places.

Model for Assessing Credit Risk

The Model Task Force of the Basel Committee on Banking Supervision identified the similarities and differences in the structure, methodology, and application of internal rating systems at the banking institutions in 1999 after surveying banks' internal rating systems and processes in roughly 30 institutions across G-10 countries¹.

1. There were similarities among the risk variables used to compile ratings, but there were variances in how they were ranked in terms of relevance and how quantitative and qualitative criteria were combined.
2. The majority of financial institutions awarded ratings based on the evaluation of the counterparty, although both one-dimensional and two-dimensional rating systems were common.
3. Similarity in the uses made of the rating data, which included limit setting, price, and management reporting.

In banks, there are three primary kinds of rating procedures, according to the Model Task Force.² One of these processes is a "statistical-based process," which uses both quantitative and qualitative risk criteria as well as the default likelihood or other quantitative tools to calculate the counterparty's rating. The bank used historical data to assess the impact of these factors on the incidences of default for a sample

of loans after first identifying the financial variables that offered information about the chance of default. The data on existing loans were then combined with the resulting coefficients to get a score that represented the likelihood of default. The rating grade was then created using the score. This approach was used primarily by a limited number of banks to assess major corporate exposures and by a smaller number of institutions to grade middle market and small company exposures.

The "constrained expert judgment-based process" was an additional rating method where banks based their ratings on statistical default/credit scoring models or predetermined objective financial analyses, but adjusted these ratings to a limited extent using judging considerations. One variation of this procedure included employing subjective criteria to raise or lower the rating obtained after using a scorecard by one or two notches. Another option was to give quantitative and judgmental elements the maximum amount of points in order to restrict the impact of such factors on evaluations. The Model Task Force deduced that when such judgements were used for rating upgrades as opposed to rating downgrades, the limitations on judgments were more stringent. This method was used by a few banks to rate major firms and by a few other banks to rate middle market clients and smaller corporations.

The assignment of ratings was heavily influenced by judging variables in the third procedure, which was the "process based on expert judgment." Different banks used judging elements in different ways. A small number of banks saw the rating produced by statistical algorithms as the "baseline" rating and adjusted it based on their own judgments. Some other banks made no use of statistical models whatsoever. Some banks believed that the statistical methods were only one factor in rating determination. In every instance, the rating authority used discretion in assigning a rating grade, notably departing from the outcome of the statistical model.

Importance of Needing Different Ratios

A bank should have distinct models for various counterparty types, but there are more criteria that necessitate the creation of separate models. The kind of a bank's credit portfolio and the characteristics of loans and advances determine how many models it may have. A bank is exposed to several counterparties, each of whom has a unique constitution and presents a unique set of risks. The risk evaluation is based on the risk variables related to capital sufficiency, asset

quality, liquidity profile, and profitability when the counterparty is a bank. The emphasis is on risk variables including current industrial regulations, industry prospects, the financials of the peer group of industries, and the soundness of the loan request if the counterparty is an industrial organization. As a result, risk characteristics change amongst various kinds of counterparties. Similar to this, banks provide loans for a range of uses, including funding commercial, industrial, and agricultural operations, as well as trade, infrastructure, and asset acquisition initiatives. Depending on the loans' intended uses, each of these activities has a different set of risk characteristics. For instance, risk considerations including the industry's development potential and economic prospects, the demand-supply gap for its goods, the project's technical viability, and its financial sustainability are taken into account when assessing risk. However, risk considerations including the kind and size of the land, the climate and environment, the quality of support and extension services, the amount of governmental backing, and other aspects are taken into consideration for risk assessment when funding agricultural projects. Again, in the event of significant exposures, risk assessment will need to be thorough and in-depth, and in the case of relatively modest loans, it will need to be condensed and straightforward. Therefore, banks should create distinct credit risk assessment models to account for changes in counterparty risk characteristics, lending aims, and loan size [7]–[9].

Importance of Old and New Borrower Rating Models

Rating a borrower's risk is a continuous process. After six months or a maximum of a year, that is, in year 2 and afterwards until the accounts are closed and the relationship is dissolved, a borrower who was rated in year 1 must be rerated. A credit risk assessment requires regular updating of borrower ratings to identify risk migration. Moreover, to perform portfolio analysis, the ratings of all borrowers must be mapped throughout the chosen time zone. Since the rating exercise is a continuous process, the preentry and postentry ratings of consumers should employ distinct rating models since the postentry ratings take into account certain extra risk variables. According to the New Basel Capital Accord, banks planning to switch from the Standardized Approach to the Internal Ratings Based Approach for the purpose of assessing credit risk must gather historical data on the likelihood of default, the loss in the event of default, and the exposure at default for a period of five to seven years.

As a result, banks must evaluate their older borrowers in light of prior years in order to compile risk-graded default-related data on an annual basis.

There are always several borrowers on the bank's books who have been doing business with it for a period of years. It is common practice among bankers to examine ledger accounts, evaluate compliance with financial discipline and credit sanction requirements, and generate an opinion about a borrower's present financial situation and creditworthiness. Along with the borrower's honesty and integrity, the bank's prior records of account operations and transactions may be used as a mirror to assess the borrower's present financial situation. Examining financial records and earlier transactions reveals inconsistencies, flaws, and issues that have previously come to light. For determining risk, it is essential to have firsthand knowledge of how current borrowers have conducted themselves and maintained discipline while managing loans and accounts in the past.

The examination fundamentally reveals the risk factors connected to the credit facilities previously provided to the borrower, such as business stagnancy, excessive trading, dishonesty, account manipulation, noncompliance, funds diversion, etc. As a result, "past dealings risk" is a crucial risk factor that must be taken into account when grading debtors who have been doing business with the bank for a while. The risks associated with facility features are significant for all kinds of borrowers and have to be included as a risk component in the rating model. Facilities Structure Risk is the name given to this risk factor. In the case of long-standing borrowers, in addition to facility structure risk, extra risk resulting from prior transactions must also be taken into account. Therefore, even if the loan's goal is the same, it is fair to build up two different models for the same kind of borrower. One model is used to rate new borrowers, while the other is used to rate veteran borrowers in the same industry. The risk component facility structure risk is included in the model for rating new borrowers, and previous transactions risk is also included in the model for evaluating old and continuing borrowers.

The kind and duration of loan facilities are two additional factors that have an impact on the pattern of models. Banks provide loans and advances for a variety of objectives and maturities. The loan maturities include short, medium, and long time frames and, in most cases, correspond to the goals of the loans and the useful lives of the assets bought with the loans. The formation, growth, and diversification of industrial projects and operations, the purchase of

equipment, and the acquisition of assets like ships and airplanes are all covered by long- and medium-term loans. Working capital requirements are met through short-term loans, which are periodically renewed. The extended loan duration and project-related uncertainties that come with long- and medium-term loans that are given out to finance projects increase the risks involved. As a result, the rating model should also incorporate an extra risk component for the risk related to project finance. Project implementation risk is the name of this risk subset. The rating methodology used to rate borrowers who take out loans for infrastructure construction must take this risk into account. The kind of counterparty, the goal of the loan, and the type of facility are the three key factors that determine how many credit risk rating models a bank should have. However, this does not imply that the risk factors and components are different for each kind of model. Regardless of the kind of counterparty, the goal of the loan, or the structure of the facility, the majority of risk components and risk variables are same across models. Project implementation risk and foreign banking risk are the risk elements that differ across models [10]–[12].

CONCLUSION

In conclusion, an important step in assessing credit risk is choosing a rating scale. When creating an effective rating scale, accuracy, comparability, relevance, and usability are crucial factors to take into account. The rating scale transforms into a useful instrument for assessing creditworthiness and assisting in informed decision-making in credit risk analysis by including pertinent risk indicators, fostering comparability, and responding to changing market circumstances. Expert input in statistical analysis, market understanding, and credit risk assessment is crucial for creating an effective rating scale. Back testing, robust methodology, and validation procedures may all contribute to the correctness and dependability of the rating scale.

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A Types of Rating Models

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ABSTRACT: Rating models are essential tools used in credit risk assessment to evaluate the creditworthiness of borrowers. This abstract provides an overview of the different types of rating models commonly employed in credit risk analysis, highlighting their characteristics, advantages, and limitations. Various rating models exist, each with its own approach and methodology. The two primary types of rating models are expert-based models and statistical models. Expert-based models rely on the judgment and expertise of credit analysts or rating committees to assign credit ratings based on their knowledge and experience. These models often consider qualitative factors such as management quality, industry outlook, and macroeconomic conditions. Expert-based models offer flexibility in incorporating subjective insights and expert opinions, but they may be prone to biases and lack transparency.

KEYWORDS: Binary Rating Model, Comparative Rating Model, Credit Scoring Model, Discriminant Analysis Model, Factor-Based Model, Financial Ratio Model.

INTRODUCTION

If banks want to transition to the IRB Approach for credit risk assessment, they must have a long-term perspective on the kind and quantity of rating models. Each kind of counterparty to which the bank is exposed should be rated using a different rating model, which should additionally include the risks related to the loan's intended use. For instance, the risk associated with financing projects, things, commodities, or real estate, depending on the situation, should be taken into account in the model for evaluating a corporate customer. For every sort of activity or every goal of a loan, a completely unique model is not required. If there are parallels between economic activities and the risk components and the risk factors are mainly shared amongst models, then the tiny changes in risk characteristics may be handled within the broad framework of models. However, it is vital to have distinct models for each of them if economic activity and risk variables are diverse, such as in the case of agricultural loans, school loans, or housing loans. The bank must identify the sorts of models it needs to grade both current and potential borrowers, as well as how to categorize the credit portfolio's clientele and lending purposes [1]–[3]. Since risk from big exposures is much greater than that from small exposures, it is required to create two or three subsidiary models inside the primary model to account for change in risk characteristics due to variations in exposure size. The general rule is that the rating model should be more stringent the higher the exposure size. Several risk variables may be removed

from the model to make it simpler and more cost-effective for grading relatively minor exposures. In the manufacturing industry, for example, the bank may use a simplified model for borrowers with loans up to \$5 million, a more detailed model for borrowers with loans between \$5 million and \$50 million, and a very complex and stringent model for borrowers with loans exceeding \$50 million. According to the exposure-size distribution of credit, each bank may choose the cutoff limits for each kind of model.

Options for New Capital Accord

The New Basel Capital Accord gives banks a few alternatives for determining the capital needed to cover credit, market, and operational risks and gives bank supervisors the freedom to choose the strategies that are best suitable for their particular banking system. The New Accord specifies two methods for figuring out how much capital is needed to cover credit risk. The Standardized Approach is the first option; it aims to determine credit risk based on counterparty ratings given by outside credit rating companies. This strategy, however, has drawbacks because ratings from external credit rating agencies are typically only available for prime debt instruments, sovereign governments, big multinational banks and securities firms, large corporations, and retail and small businesses, which account for the majority of borrowers in many banks. Setting the values of risk weights against each rating grade given by various external rating organizations may not be consistent among credit institutions throughout the globe. Furthermore, it is difficult to compare the risk ratings

given by various organizations since the methodology, the risk variables, and their relative importance may vary. More crucially, it's possible that external rating agencies don't always provide credible ratings, as was shown by the incorrect ratings given to mortgage-related securities that fueled the 2007–2008 U.S. financial crisis.

In accordance with the Standardized Approach, banks must give unrated exposures a risk weight of 100 percent when calculating regulatory capital, regardless of the actual levels of risk posed by these exposures. This restriction means that the Standardized Approach can only approximate risk-aligned capital. The goal of keeping an adequate amount of capital based on the various degrees of risks associated with unrated exposures is not achieved. Since there will be a huge number of unrated exposures, the actual picture of the bank's credit risk profile won't be revealed. Because greater measures cannot be focused toward high-risk exposures, risk monitoring and risk management systems will become less effective.

The IRB Approach, which permits banks to employ in-house built rating systems for credit risk measurement, is the second option for assessing credit risk under the New Accord. It places a lot of responsibility on the banks since they will have to calculate the overall capital need against credit risk using their own estimations of the chance of default, loss rate given default, and exposure at default. The Standardized Approach has the drawback of not directing the bank in the efficient administration of the credit risk management function; instead, it focuses primarily on regulatory capital evaluation. Credit risk management and capital adequacy evaluation are two distinct but related tasks. While the latter's concentration is on credit administration, which includes sanction, disbursement, follow-up, monitoring, and credit recovery, the former focuses on credit risk identification and measurement to determine the amount of capital necessary to cover credit risk. Even if a bank uses the Standardized Approach, it will still need to implement a complex credit risk management process. However, the IRB Approach offers further contributions and vital data on risk-related topics that will aid banks in carrying out the credit risk management function effectively. In the long term, it is far more advantageous for banks to use the IRB Approach for credit risk management and capital adequacy review.

DISCUSSION

Asset Categorization

If banks wish to create their own credit risk assessment methodology, they must first set up an internal credit risk rating framework. In order to match product designs with client demands, banks have developed a variety of credit product kinds. Banks design credit facilities to protect both their own interests and that of their consumers. Each credit exposure has distinct features that may be determined based on the client type, the loan's purpose, the amount and term, the collateral coverage, and the guarantee protection. Due to the fact that various kinds of credit assets display various risk characteristics, it is important to construct a framework for assessing credit risk that comprises of several rating models. If the internally generated credit risk rating system is to be acknowledged by the bank regulators, banks must adhere to a set of benchmark norms under the IRB Approach [4]–[6].

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

Assessment of Model Inputs

Borrowers are subject to both internal and external credit risks. External variables are those that neither the borrower nor the bank have any influence over, such as macroeconomic policies and the overall economic and political climate. The fiscal and monetary policies, the industrial policy, the import-export policy, and the rules governing cross-border transactions are the external elements. Banks and financial institutions are significantly impacted by changes to the government's fiscal policy, the central bank's monetary policy, the bank supervisor's supervisory policy, and changes to market factors, which modifies their risk profile. As a result, while creating risk rating models, it will be necessary to take into account the risk from negative changes in policies that place economic and financial restraints on bank borrowers.

The external risk elements that are taken into account by the rating models are those that have a detrimental effect on the borrower's commercial operations. Two steps are used to evaluate the risk. A first impression is formed regarding potential developments that might

occur in the regions designated as being external to the borrower and the bank, and a second impression is evaluated regarding the likely impact of those developments on the future prospects of industries, trade, and commerce, as well as the borrower's ability to earn money to pay back the loans. The goal is to have clients who are particularly vulnerable to adverse changes in external circumstances and whose ability to service their debt is anticipated to be severely compromised as a result of these changes be rated lower on the rating scale.

Internal factors are those that the borrower may control directly. Internal risk variables include both financial and nonfinancial components. The financial risk variables come from the borrower's financial accounts, balance sheets, and information on how well the firm is doing. The debt-to-equity ratio, current ratio, cost-to-income ratio, profitability ratio, turnover ratio, and other ratios are examples of financial risk variables. The borrower's financial situation is eventually impacted by the nonfinancial risk factors, which are descriptive and qualitative in nature. Industry prospects, manufacturer rivalry, product quality and marketability, access to infrastructure and skilled personnel, and other non-financial risk factors are a few examples.

The risk variables that are included into different models are often similar. The rating models may be updated with modest alterations when risk factors somewhat fluctuate across models owing to variations in client type, exposure amount, credit purpose, and credit duration. We can come up with a number of risk variables that can be included into the rating models, but it will be wise to limit ourselves to those that are significant and that cover practically the full spectrum of hazards for two reasons. First, gathering data on certain finer risk aspects, which may not be particularly significant and may only have a little impact on the risk grade, is difficult and time-consuming. Second, the expense of gathering a lot of data could be expensive and the returns might not be equal.

Banks must define all risks that result from various exposure types when conceptualizing the design of credit risk rating models. The risk identification method has three stages: identifying the risk components that make up the rating model, identifying the risk factors that make up a risk component, and identifying the risk elements that make up a risk factor.

The Determination of Risk Elements

The following are the general risk elements that may be included into various rating models:

1. Industry/business stability risk and potential.
2. Supervisory risk.
3. Risk to financial viability.
4. Structure of the facility risk.
5. Transaction history risk.
6. International banking risk.
7. Implementation risk for a project.

The majority of the models share four of these risk components, components 1 through 4, and they employ the component from the remaining three, components 5 through 7, that is suitable for the relevant exposure. When choosing which risk factors to include in a given model, financial institutions may differ somewhat. However, despite the fact that the technique for rating might vary, these differences will be minor since the types of risk that are associated with a certain kind of counterparty are widespread. The following section provides an explanation of the risk factors that are considered while assessing the hazards that fall under each broad risk component.

Risk Analysis of Components

Prior to deriving a counterparty rating, banks should evaluate the risk attached to each element of the rating model. To calculate the amount of component risk, they should first identify and list the risk factors and risk components that make up a risk component relevant to a model. The next section discusses each risk component's risk factors and risk aspects, albeit this list is not all-inclusive.

Prospects for The Industry/Business and Stability Risk

In order to finance industrial and manufacturing operations, banks must evaluate the industry's future prospects and the size of the firm. Different exposures related to various businesses carry varying degrees of risk. For instance, the performance of other businesses that utilize steel as a raw material, such as shipbuilding, automotive manufacturing, construction, and other industries, greatly influences the risk associated with exposure to the steel industry. The industries that give their products to other industries for use as inputs or that utilize the products of other industries as inputs have a positive association. This correlation element is important for banks to consider when evaluating the risk associated with funding industrial projects and manufacturing activity. The danger associated with stagnant or slow development in other pertinent businesses will be less intense the lower the coefficient of correlation between connected industries.

To evaluate the current state and the potential for the relevant sector, banks must look at a few risk factors, including the industry's relative position in the economy, its vulnerability to cyclical changes, and its relative profitability. Some crucial financial indicators that indicate the trajectory of the financial performance of a certain sector are the average return on capital, the average profit margin as a proportion of sales, and the relative stability of profits. Examining risk factors like the government's licensing policies, trade policies, and import-export policies, as well as the industry's growth potential and future outlook, the demand-supply gap for its products, and the level of domestic and international competition it is likely to face, will help determine the industry's future prospects. The assumption is that it is riskier for the bank to fund a certain kind of industry the more unfavorable the risk factors are. Another significant risk element is the danger caused by inadequate and poor-quality infrastructure support. Banks must carefully assess the level of infrastructural assistance that the sector will get in order to continue producing over the long run and maintain operational stability.

Banks must evaluate risk elements such as the business climate, market competitiveness, and product pricing policy in addition to industry prospect risk when determining the business prospect risk. In order to determine the size at which the proposed industry is likely to operate as this has a significant impact on the cash flow, it is vital to look at the current level of capacity utilization in the same kind of sector. To determine the operational efficiency, it is also important to study the size of production and selling costs in comparison to those seen in comparable industrial units. Relevant are even the personnel policies that control labor relations. The assumption is that the supply of its goods at competitive costs will be interrupted unless the industry achieves appropriate capacity utilization and runs efficiently. The risk associated with business prospects will be significant and the business level will be poor.

Market competition and consumer acceptance of the items the sector will produce are additional risk factors. Banks should evaluate their product variety, marketability, marketing plan, and selling arrangement, as well as the demand-supply gap for their items. From a business perspective, a sector that manufactures a narrow range of products, whose products have a brand image, and which has a chain of sale outlets, is less risky than a sector that manufactures a wide range of products, whose products have a brand image, and which will produce

goods whose quality and acceptability are yet to be established in the market. The capacity of the proposed sector to follow a flexible pricing strategy that permits price manipulation of its goods in competitive marketplaces to keep its market share and survive in a situation of increasing input costs and dropping selling prices is an additional risk aspect [4]–[6].

For the purpose of rating, banks should conduct an overall evaluation of all these risk variables and risk aspects to determine the amount of industry/business potential and stability risk. To estimate the level of risk associated with funding a certain sector, banks often conduct this form of risk assessment as part of a conventional due diligence process.

Executive Risk

Managerial risk is a significant risk factor that affects the counterparty rating since inadequate industry or company management results in failures even when all other conditions are satisfied. When evaluating a loan request, banks give the quality of management a lot of weight. They analyze the ownership structure, the professional ability, the prior experience, the track record, and the condition of corporate governance to determine the management risk.

An major risk issue is the ownership structure of the borrowing company. The risk should be evaluated by looking at the legal entity's structure and stock holdings. Since the company is controlled and constrained by a number of legal rules under the Companies Act, which are more substantial and broad-based than other pertinent legislation, the corporate form of ownership is less dangerous than other forms of businesses. A corporation is required to uphold transparency and disclosure requirements as well as many legal responsibilities. Dealings with corporate customers are thus less dangerous as a result of their expert management style and increased action visibility. The hazards from the customers are higher when the rules and regulations are not thorough and the management activities are not transparent.

The second risk consideration is the borrowers' historical performance and track record in managing the industry and company in question and honoring prior financial obligations. The track record is assessed based on the borrowers' prior record of successfully completing projects and statistics on the realization of desired sales and profits. Banks must examine the borrower's track record broadly and take into account their background in any field or line of work. A solid track record may be shown by timely payment of taxes and duties to the government as well as dues to market

debtors. Lack of prior experience, defaults, and late payments of obligations are signs of a poor track record. The risk is increased if there is evidence of these characteristics. The amount of risk decreases with the borrowers' longer management and technical expertise and stronger financial track record. The amount of risk will be quite high if the borrowers are relatively new to the sector or trade and little is known about their prior performance. The most dangerous management is one with a damaged reputation, questioned moral character, and dishonest business practices.

The potential customers' corporate governance standing makes up the third risk component. Corporate governance's crucial components include a suitable organizational structure that supports competent management, operational transparency, management responsibility, and a succession plan. Less hazardous is an adequate organizational structure with fully dedicated management that is aware of changing environmental and functional needs, that adheres to impartiality and transparency in the assignment of functional tasks, and that thinks policies should be made public. On the other hand, management that has overlapping duties and responsibilities, adheres to governance practices that are inward-looking, and is unaware of the needs of succession plans entails a larger risk. The conclusion is that there is a direct correlation between management risk and the likelihood of company failure and nonpayment of bank debt. The degree of management risk is determined by the evaluation of various risk aspects and risk variables.

Risk of Financial Viability

The danger to financial viability is the most significant of the risk factors. Through an evaluation of the sufficiency and consistency of revenue produced from the project or company that the bank supported over the term of the loan, financial viability is determined. Banks determine if a borrower is capable of repaying a loan by looking at previous financial indicators and projected industry/business cash flows. By calculating a few crucial financial ratios from the borrower's balance sheet and other financial documents, and comparing these ratios to the benchmarks, they are able to evaluate the risk of financial viability. The following crucial financial factors are taken into consideration while assessing the risk of financial viability:

1. Ratio of current obligations to current assets.
2. Ratio of tangible net value to total external liabilities.
3. Ratio of debt payment to income.
4. Net profit and operating profit.
5. Return on investment in capital.

From the most current balance sheets of the borrowers, banks calculate these financial metrics, both with regard to historical operations and future activities, and assess them to gauge the risk associated with financial viability. According to the conventional credit evaluation approach, a loan proposal's financial soundness is determined by looking at both the financial ratios and the revenue produced by the industry or firm. The internal rate of return for the project or industry is calculated and put through a sensitivity analysis while the cash flow statements are being created. After the borrower has paid the bank's debts, the profitability of the investment is measured by the internal rate of return. In addition to calculating internal rate of return, year-by-year inflows and outflows of cash are computed throughout the project's economic life to assess the sufficiency, stability, and excess available to pay the loan.

The conventional approach of project evaluation analyzes the financial metrics, which are also used to determine the financial risk component for risk rating. For instance, the examination of debt service coverage ratio provides details about whether project revenue is sufficient to pay off a loan. This ratio is a factor in the rating calculation. The less financial risk there is, the higher the debt service coverage ratio. Since financial ratios are generated from the borrower's financial accounts, the accuracy of the balance sheets or statements is a significant risk factor. How far financial ratios may be regarded as dependable and consistent depends on a rigorous analysis of the balance sheet. As a result, financial accounts that have been audited by reputable chartered accounting companies are more trustworthy and less dangerous to use as a basis for drawing conclusions.

It is not wise to draw conclusions about the financial risk just based on the financial criteria of the current year. It makes sense to take into account the financial parameter trend over the previous three to four years if the client has been operating a firm or industry for some time. The customer's effectiveness in attaining fair growth in sales and profits over a longer time is shown by a study of the trend. If just the current year's results are considered, the financial ratios and other criteria are likely to be skewed since these results may include an element of extraordinary fluctuations in the volume of sales and profits owing to favorable

variables that are unsustainable. The financial criteria of comparable industries or companies should be taken into account to evaluate if the industry or company for which the customer has requested for a loan is likely to be financially sound if the customer is new and does not already have a business. When evaluating the financial viability risk component, banks take into consideration both the risk factors pertaining to historical financial performance and the reliability of cash flows.

The effect of upcoming uncertainty on the cash flow estimates is another component of financial risk. Banks should analyze the risk from two perspectives by looking at how the customer's financial situation and expected future cash flows would change if certain unknown but likely occurrences occur. First, if the consumer needs to pay certain unanticipated bills, how will that affect their financial situation? Second, if any unfavorable occurrences take place, what will be the expected effect on the capacity to obtain further cash or capital from the market? These scenarios make up potential causes of viability risk. When determining whether a loan is repayable over the long or medium term, banks must carefully consider these circumstances. The amount of financial viability risk may be determined by looking at all the relevant risk aspects and risk variables.

Structure of Facility Risk

Risk associated with facility structures should be evaluated from several angles. Not only is there a risk associated with the way credit facilities are structured and how vulnerable collateral is, but there is also a risk associated with other elements like the length of the borrower's relationship with the bank, the number of credit institutions from which the borrower uses the facilities, and the facility's foreign currency component. It is incorrect to evaluate the risk of the facility construction in a vacuum, focusing only on the potency of the collateral and ignoring other aspects.

The bank's degree of risk decreases with the length of its relationship with the borrower and the amount of knowledge it has about that person's prior transactions. As a result, it is evident that the risk from new borrowers is greater than that from existing borrowers due to the "unknown factor." In addition, there is an increased risk when banks attempt to develop relationships with high-value clients beyond the point where they can depend exclusively on their prior integrity. Because the financial industry is very competitive and market factors change regularly, it is incorrect to believe that the bank's interest is always

protected if the clients' transactions have been acceptable. Furthermore, if high-value clients are aware of the bank's desire to maintain and grow the banking relationship, they may use this knowledge as leverage to negotiate conditions of penalty that are often counterproductive to the bank's interests.

Two other components of risk are banking arrangement and facility structure. Different combinations or packages of facilities that a borrower needs provide varying levels of risk to the bank. Financial and performance guarantees, as well as letters of credit, are examples of facilities that provide financial assurance to third parties. These facilities carry a higher risk due to the fact that customers frequently fail to uphold their commitments to the satisfaction of the third parties, forcing the latter to file claims against the bank. Facilities like overdrafts against stock shares as collateral pose a higher risk since a rapid drop in equity prices might significantly lower the value of the collateral. In a similar vein, facility structure risk is also influenced by the banking arrangement. Bank risks are reduced when many credit institutions pool big loans among themselves, however banking with multiple institutions is riskier due to the lack of coordination between them. Customers may turn to several banking agreements to get around a bank's strict financial regulations [7]–[9]. They often accept loans without their original banker's knowledge or approval, which calls into doubt their honesty. It has been observed that some borrowers request trade bill financing from one bank while requesting term loans and overdraft services from a different bank. The borrowers' goal is to conceal from the later bank the number and amount of sales, which are clear from trade invoices that the former bank has discounted.

Collateral risk is the third and most significant component of facility structural risk. Because collateral is either not marketable or is very subject to price change, its realizable value is unknown. The amount of facility building risk is mostly determined by the value and caliber of the collateral. The risk from the facility and total financial risk are lower the higher the value of the collateral and the simpler the route for sale. When it comes to risk mitigation, collateral's quality and marketability matter more than how tangible it is. More tangible than certain other forms of assets, land, buildings, plants, and equipment, as well as residential and commercial properties, have a lower level of risk mitigation due to the laborious process of selling the securities in the event that the borrower defaults. Only financial collaterals, the

values of which are immediately realizable with certainty, are recognized as risk-mitigating security for gaining capital relief under the New Basel Capital Accord due to the limited marketability of certain forms of physical collateral. The bank is relieved from having to allocate capital against the relative exposure to the extent of their realizable values thanks to the financial collateral. As a result, facilities backed by collateral that is readily realizable are less risky than those backed by collateral with limited marketability. High risk is associated with unsecured or clean credit facilities.

The exchange risk that results from the foreign currency component of the credit is the fourth component of facility structure risk. Customers get foreign currency loans to establish joint ventures overseas, purchase equipment and raw materials, or for any other reason. These loans must be repaid in foreign currency over the course of a medium period in installments. Due to the added expense, customers are often hesitant to seek protection against exchange rate changes. The debtors are unable to pay the higher debt load because of the unfavorable exchange rate when the home currency depreciates beyond a certain threshold. Customers are better able to satisfy repayment commitments even if the local currency is consistently declining when they earn foreign currency via the export of their goods or get remittances from connected units or joint ventures overseas. The risk against the foreign currency component of the loan is higher when the customers do not earn foreign exchange or take forward protection against the exchange risk. This kind of risk began to arise during the Asian financial crisis of 1997, when banks' credit risk grew as a result of exchange rate volatility. Banks should evaluate each of these risk components and risk variables and determine how much facility structural risk is there [10]–[12].

CONCLUSION

In conclusion, Expert-based models, statistical models (discriminant and PD models), and tailored models for certain sectors or asset classes are the many kinds of rating models used in credit risk assessment. Each class has unique traits, benefits, and restrictions. The accuracy and efficacy of credit risk assessment may be improved by combining several models via a blended approach, enabling reasoned judgment in credit analysis and risk management. To maximize each model's advantages and minimize its disadvantages, financial institutions and rating agencies often combine various rating models. The term "blend

model" or "hybrid model" refers to this strategy. Combining statistical and expert-based models enables a more thorough and reliable evaluation of credit risk, using both quantitative analysis and qualitative insights.

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A Brief Study on Past Dealings Risk

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ABSTRACT: *Past dealings risk, also known as relationship risk or historical behavior risk, is a critical aspect of credit risk assessment that focuses on evaluating the borrower's previous financial activities and interactions with the lender. This abstract provides an overview of past dealings risk, highlighting its importance, key considerations, and the impact it has on credit risk analysis. Assessing past dealings risk involves examining the borrower's historical track record, payment history, and previous interactions with the lender or other financial institutions. It aims to identify patterns or indicators of potential creditworthiness or creditworthiness deterioration based on past behavior.*

KEYWORDS: *Adverse History, Background Checks, Collateral Valuation, Default History, Financial Misconduct*

INTRODUCTION

I outlined the justification for establishing different credit risk assessment models for new and existing borrowers in section 10.3. It is incorrect to give a risk rating to a borrower who has dealt with the bank for a particular amount of time without taking a close look at those transactions in the past. The borrower's prior compliance with sound accounting practices and monetary restraint is the main focus of the past transactions risk. Revolving overdraft or renewable cash credit facilities, where credit limits are sanctioned for a specified period of time, often one year, and the borrower is allowed to run the accounts on an ongoing basis within the sanctioned limits, are normally subject to surveillance of activities in the accounts. But abnormalities in the accounts often happen, either as a result of money being withdrawn in excess of approved limits or as a result of returning unpaid checks or unpaid trade invoices. The borrower's reputation is tarnished if money is regularly withdrawn in excess of the authorized limits or if cheques and trade bills are sometimes returned unpaid during a year.

The bank should be careful while working with him or her in such circumstances and be aware of the warning signs. Additionally, the borrower is expected to exercise sound money management and abide by the terms and conditions of lending facilities. The degree and quality of compliance by the borrower with the terms and conditions of credit facilities are revealed by an examination of operations in the ledger accounts, which define the amount of previous transactions risk. prior transactions risk is significant when the evaluation of the borrower's prior dealings finds egregious violations of loan sanction conditions or a

pattern of irregularities. The rating of previous transactions risk should be used as a rider and the risk rating applicable to the borrower should be decreased if the anomalies are substantial or the past dealings are unsatisfactory, even if other risk components indicate a good situation [1]–[3].

International Banking Risk

The methods used to apply the standards for grading domestic and international borrowers do not fundamentally vary from one another. The same risk factors that apply to domestic borrowers—managerial risk, financial viability risk, facility structure risk, and prior transactions risk—apply to borrowers in overseas branches of banks as well. The risk aspects should be evaluated in light of the local circumstances and legal framework of the relevant nation even if the risk factors are generally the same. For instance, while evaluating the industry/business prospect and stability risk, it is important to consider how the borrower's operations in the nation in question would affect the risks related to the industry's development potential and the government's industrial and trade policies. However, the subjective criteria and the quantitative parameters taken into account when evaluating management risk and financial viability risk are largely the same. For instance, the same risk factors—past performance, professional competence, corporate governance procedures, and management succession planning—are taken into account when evaluating the managerial risk associated with a borrower operating overseas.

An extra risk factor that is included when grading borrowers who have exposure to a bank's abroad branch offices is overseas banking risk. The risk is evaluated twice: once at the overseas branch office and

once in the bank's corporate headquarters. Three risk factors—country risk, currency risk, and transfer risk—make up the foreign banking risk component. When a foreign branch office offers financing to people who are not citizens of that nation, there may be an added risk. If a borrower's port of shipment and port of destination are both outside the nation where the overseas branch office is situated, there may also be a collateral risk. In the latter scenario, the branch office that provided export credit backed by documents of title to goods lacks an independent source to confirm the goods or the sale-purchase information provided by the borrower, and it is also unable to seize the goods in the event that the importer rejects the bills or fails to make payment by the due date.

The characteristics of the nation risk, currency risk, and transfer risk are closely connected and do not vary much. In actuality, currency risk and transfer risk are brought on by a nation's worsening economic situation, which also gives rise to country risk. Country risk is the possibility that a country won't be able to pay back its debts to foreign banks, financial institutions, and international organizations. Political developments or a crisis scenario might cause the nation to reject payment on its debts or make it impossible for it to keep its promises to pay in foreign currencies. Due to a lack of readily available and trustworthy statistics and information, it is not feasible to assess and rate the economic health of a significant number of nations. The acceptable option is to use the country rating provided by international rating organizations, cross-check it using the bank's data and information, and then provide a score to the risk component "country risk."

Currency risk is the possibility of a loss as a result of unfavorable exchange rate movement, which raises the risk of default. Examining the exchange rate's relative stability and forming an opinion on its potential future movement are both required for determining the currency risk. When determining the magnitude of currency risk, the bank should consider the recent swings in exchange rates, the macroeconomic factors, the economic stability, and the country's rating.

Transfer risk is the danger of unexpected limitations imposed by the government or the country's exchange control body on the exchange of local currency for a foreign currency. The borrower may be able to repay foreign currency loans obtained from a bank located in another country on time in domestic currency, but if he is unable to convert domestic currency into foreign currency and remit the funds, he is considered to have

defaulted on the loan in the bank's books. Due to the limitations placed on the conversion of domestic currency into foreign currency, even if the borrower obtained a loan from a local branch office of a foreign bank and paid the installments in local currency, the branch office is unable to transfer funds to its parent office. It is required to consider the strength of the borrower's home currency, the economic and political stability indicators, and the nation rating in order to assess the likelihood that transfer risk would manifest within a certain time zone and to provide a suitable grade. The additional risk that could result from exposures to non-resident borrowers and the uncertainty surrounding collateral protection should be evaluated on a case-by-case basis, taking into consideration the track record, business profile, and reputation of the manufacturer or supplier of the goods. Banks should analyze the amount of overseas banking risk connected with clients in other countries by looking at the risks from all of these risk aspects and risk variables [4]–[6].

DISCUSSION

Project Implementation Risk

Long-term loans are often used to fund infrastructure projects in the electricity, transportation, communications, petroleum, and other industries. The risk factors that are taken into account for financing industries with manufacturing operations are also taken into consideration when evaluating the risks associated with project finance. Project financing, however, has a few unique traits of its own. As a result, various other hazards that are pertinent to projects are also taken into account. Examining project management risk elements as well as the project's technical and financial viability is part of the process of assessing project risk. A project's financial sustainability is very susceptible to delays in its completion. The cash flow estimates are significantly distorted by cost growth, increased borrowing costs, and a delay in receiving income from the sale of products because of the lengthened gestation period. Delays in project completion also force lenders to reschedule or restructure the loan at first, damaging the promoters' standing in the banking and business communities. As a result, it is crucial to evaluate key risk factors such as the potential for project completion delays, the likelihood of cost growth, and the uncertainty surrounding the financing of cost overruns. Furthermore, management experience in managing projects in the past is a significant risk factor

because project implementation requires meticulous planning and execution in stages. Depending on the nature of the initiatives, certain other sorts of hazards could emerge. The project location, for instance, is very important in commercial real estate developments. Additional risk factors include the site's ownership, location, and technological appropriateness. They also include restrictions on obtaining site possession. Three financial risk components are also a part of project risk: the loan's term, asset coverage, and debt-service coverage ratio. For the purpose of determining whether a project is financially healthy, banks should assess these three risk factors.

The risk will increase as the loan's payback duration lengthens because more uncertainty would exist. Due to the significant financial outlay required for a project, it is essential to consider both the economic life of the project and the ratio of projected revenue to total debt obligations of the borrower. The project's intrinsic ability to produce revenues to pay off the debt over a 10- or 15-year term is ensured by a fair excess of income. The risk of default will increase as the debt-service coverage ratio decreases. The amount of project implementation risk should be evaluated by banks after looking at all these risk factors that are pertinent to project implementation.

In order to transition to the Internal Rating-Based Approach suggested in the New Basel Capital Accord for credit risk assessment, banks should have a long-term perspective on the number of rating models they want to have. To account for differences in risk characteristics across counterparties, loan objectives, and facility kinds, banks should construct as many credit risk rating models as are required.

Although banks should put up many models for evaluating various counterparty kinds and economic activity types, it is not required to have completely unique models for each one. The differences in risk characteristics may be addressed within the major models via minimal adjustments if risk components and risk variables are substantially consistent across counterparties and economic activities. Since prior transactions have an impact on the rating, banks should develop different models for evaluating new and existing borrowers. Additionally, a distinct model for rating debtors who remain on the bank's books for longer than a year is required to preserve continuity of rating. The Basel Committee on Banking Supervision study, performed in 1999, found that the counterparty rating, rather than the facility rating, the kinds of risk factors utilized in rating, and the similarity of reasons

for utilizing ratings were the common aspects in the banks' rating systems. Each credit risk assessment model is made up of a few basic risk components, some of which are risk elements and others are risk factors.

Methodology for Rating Credit Risk

The whole risk profile of the borrower is captured by credit risk rating models, which then provide ratings based on the quantitative and qualitative evaluation of risk variables. By using subjective criteria, banks may also change the ratings that the models provide. There are several methods for calculating risk ratings, however in this book I provide straightforward approaches for calculating counterparty ratings. The model considers all credit facilities granted to a borrower in various places pertaining to the borrower's whole activities and generates a rating that reflects the overall risk associated with the borrower's full portfolio of bank obligations. When necessary, the facility structural risk may be assessed individually and interpolated into the rating model to obtain the final rating. The model takes into account facility features in the calculation of the overall rating [7]–[9]. Following are the stages in order for credit risk rating:

1. Identifying the risk factors.
2. Risk factor identification.
3. Identifying the risk factors.
4. Weights are assigned to risk elements, risk factors, and risk components.
5. Risk factors are given ratings.
6. Rating of the risk component computation.
7. A risk grade or overall risk rating is assigned.

Risk assessment and weight distribution

Four steps make up the risk assessment process:

1. Risk component strength.
2. Risk component level.
3. Level of a risk component.
4. Comparative level.

Each model is made up of a handful of risk elements, which are themselves made up of a handful of risk factors. But not all risk factors, elements, or components are equally important, thus they cannot all be given the same weights when determining a risk grade. Even when a loan is valued using the conventional way, the ultimate judgment is made based on an analysis of a few key elements. For deciding whether to provide the loan, the project's technical and financial viability are more important. The counterparty's risk rating may be calculated using the same logic. For instance, the risk component "financial viability risk" is vital and extremely

relevant, is comparatively more material than other risk components, and is thus allocated a larger weight among the risk components that are used to calculate risk rating under various risk models.

The risk component "growth potential and future outlook" is considered relatively more significant than the risk component "demand supply gap of its products" in the assessment of "industry/business prospect and stability risk," and similarly, the risk factor "future prospect of the industry" is considered relatively more significant than the risk factor "infrastructure support" Although each risk component, risk factor, and risk element is important in and of itself, the relevance of each differs depending on the kind of rating model used. In order to provide a weight that corresponds to the item's perceived risk in respect to the other items, the relative importance of each item in the model must be determined. Among all the risk factors, the financial viability risk is the most important and bears the greatest weight. According to their relevance in each rating model, additional risk factors may differ in relative importance. Due to variations in borrower status, loan purpose, and loan term, different models will have different weights to be given to risk components, risk factors, and risk aspects.

Past transactions risk, which is a key element for maintaining the sanctioned limits in the case of current borrowers, is comparatively more essential than managerial risk and risk related to the facility structure. As a result, it has been given more weight. The borrower is having trouble managing the company if the account operations are poor or stagnate, or if the accounts have sometimes been irregular in the recent past. This increases the likelihood that the account will soon become nonperforming. In this case, the borrower receives a rating that indicates a very high risk. This kind of credit facility should be placed in the watch category by the bank, and it should be closely watched.

The bank should give various risk components weights in accordance with their importance in a model. Due to their equal importance in the model, two or three risk components may sometimes be given comparable weights. for establishing a commercial enterprise, such a power or communications project. This approach takes project implementation risk into account and gives each item a risk weight based on its importance. Older borrowers have reduced project implementation risk since it is given a significantly lower weight because their track record and management ability are well established. This allows

for the identification of risk components relevant to various model types and the assignment of weights based on the relative importance of those components.

Putting A Value On Risk Factors

The next stage in rating calculation is to give the risk variables that make up a risk component weights. The distribution of the weights should be such that the weight given to the risk component in the model is identical to the sum of the weights given to risk factors. Due to the different risk characteristics and relative importance of risk variables, the weights given to risk factors vary amongst models.

Score-Assignment Scale

According to the level of risk and the need to maintain granularity in risk grading, scores are given to risk components according to a specified rating scale. The amount of risk analysis necessary to achieve accuracy in rating may be taken into consideration while choosing the score assignment scale, which is shorter than the risk rating scale. Because of the changes in risk perception brought on by minute variations in risk characteristics or risk-related factors, the risk analysis should be thorough to assess a significant counterparty or large exposure. If the bank 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, the development of infrastructure projects, and commercial real estate, it may have a longer scale for assigning scores to risk elements. For determining scores for risk factors that apply to small and retail borrowers, including those in the agriculture sector, it may have a scale that is comparatively shorter. A six-scale score assignment is adequate in relation to a big counterparty, but a four-scale or even three-scale score assignment may be sufficient for small and retail borrowers. Borrowers who take out personal loans, such as mortgages for homes, auto loans, or student loans, may be assigned a three-scale score. The bank must set up the proper scales while taking into account the distribution of loans and advances by size and its credit profile. If it is obvious that using a longer scale won't significantly affect the production of ratings in the majority of situations, the bank may compromise by using a shorter score assignment scale to save time and money.

Standards for Scoring

The rating models should include a built-in mechanism to establish uniformity in rating assignment inside the company. This is one of the

guiding principles for evaluating the effectiveness of the risk rating framework. Even though various persons may score a counterparty at different places using both subjective and objective elements, the risk rating model should provide the same results for the same counterparty. Because various financial institutions may use different standards, the risk assessment based on quantitative and qualitative characteristics may differ across them. However, variations in the risk grade assigned to the same or a comparable borrower within the same firm may occur due to potential variations in personnel's risk assessment. Even if the exercise may be carried out by several groups of individuals, the bank's goal should be to establish consistency in the assignment of risk grade to the same borrower or to borrowers having comparable attributes. Despite the fact that the facts and set of information relevant to the borrower may be the same, variations might arise in the quantitative and qualitative evaluation of risk by various individuals. Various ratings for the same borrower handled by various people may result from this kind of difference in risk perception.

By creating uniform rules for the assignment of scores, the likelihood of variance in the risk grade given to a borrower under comparable conditions by various employees within the same bank or financial institution may be significantly reduced. The norms determine the ratings that should be given for each risk category based on several sets of criteria. The use of discretion to change or manipulate the rating will be limited by the adoption of defined standards. It will be necessary to define standards for calculating scores in relation to each risk factor. There will be many risk components for which scoring standards will need to be defined since each risk component typically comprises of three to four risk factors and each risk factor four to five danger elements. The majority of the risk components are shared by all models, although they change when they pertain to rating models for diverse counterparties, such as borrowers in the commercial real estate and manufacturing sectors. The scoring norms for risk aspects that are shared by all models are basically the same, although it is possible that the norms may need to be changed if other traits or features are discovered.

The properties or features used to define the scoring standards may be seen when the risk factor is analyzed. The ratings are assigned based on the characteristics/qualities that are discovered via market research, examination of balance sheets, financial statements, and other trustworthy papers, and

compliance with accepted banking standards. A few options that are most likely to arise or exist in connection to a point that is important for loan evaluation are used to represent each standard. The description of characteristics or qualities should not exactly reflect the current scenario in order to give ratings to risk aspects during the actual rating process. There will seldom be a circumstance when the description of characteristics will perfectly match the actual results; instead, the features/attributes represent several possibilities, and the scores should be assigned based on the idea of "similarity or nearness."

The findings that result from the examination of each risk element's characteristics and qualities serve as the foundation for the risk element's evaluation. The rating and score assigned to it improve with how beneficial the features are in terms of the banker's opinion of safety. In decreasing order of rising risk perception and increasing scores, the qualities and attributes are listed. The norms define a collection of traits, qualities, or features that determine the relative level of hazards that could result from the risk factor in various situations. For instance, if a risk element's traits or attributes show extremely excellent qualities, it denotes "very low risk," and score 5 is given to that risk factor on a six-scale score chart. The risk aspect is classified as "unaccept risk" and given a score of 0 if its traits or qualities are of a very high order. When scores are assigned based on judgment, the judgmental opinion is based both on data from credible sources and quantitative indications. When calculating risk factor ratings, banks should adhere to these guidelines. The sentences that follow provide descriptive examples of scoring norms related to several categories of risk components. A six-scale rating system is used to determine the scores. The scoring standards based on a qualitative evaluation are covered in Part I, while those based on a quantitative assessment are covered in Part II.

Norms for Part I scoring based on a qualitative evaluation

Consider that we wish to evaluate a borrower who has sought for financing from the bank to establish an industrial unit. Industry/business potential and stability risk is one of the risk components in the rating model. It is made up of two to three risk factors, each of which is made up of a few risk elements. Let's suppose that one of the risk components under this risk element is "growth potential and future outlook" as we have observed that one of the risk factors under this component is "future prospect of the industry."

Component Rating Derivation

The counterparty's risk rating is completed in two steps. The risk is first evaluated on a component level, and the component risks are then combined to get the risk grade that may be assigned to the counterparty. The weighted average score is mapped to a specified rating scale after each risk component is independently scored and given a rating. This results in the component ratings being combined into a single rating.

Let's say a client has requested a loan from a bank to launch a business. Assume further that the managerial risk is low, the financial viability risk is minor, and the facility structure risk is low, in addition to the industry/business potential and stability risk being graded as moderate and connected with the loan proposal. The borrower's total rating is then calculated by adding the component ratings for each individual component. It is feasible to provide an appropriate rating to the component via the score assignment procedure after weights are assigned to risk components, risk factors, and risk elements, and norms are defined for assignment of scores to risk elements. This is accomplished by adding up the weighted scores of each risk component, giving a risk grade to each one, and comparing the results to the rating scale that has been specified.

The two-stage rating procedure used by the credit risk rating models presented in this book. To get the overall rating of the counterparty, each risk component is first independently appraised and given a rating. The component ratings are then combined. Component ratings and counterparty ratings are both based on the same rating scale. In various kinds of rating models, risk components, risk factors, and risk aspects have differing degrees of relevance. Their relative relevance is acknowledged in the rating models by the assignment of varied weights that correspond to the risk perception in order to achieve accuracy in rating. Risk assessment comprises both quantitative and qualitative analysis, the latter of which is based on quantitative characteristics. After a quantitative and qualitative evaluation, each risk aspect is given a score, turning the rating exercise into a score-based procedure to guarantee rating accuracy. In suitable situations, banks may use discretion to adjust ratings produced from established models based on subjective criteria. To reduce the chance of differences in how a risk grade is given to a counterparty under identical conditions by different individuals, banks should establish guidelines for scoring risk aspects. The defined standards should essentially accomplish consistency and uniformity in ratings and reduce room

for discretion in modifying or rearranging the rating [10], [11].

CONCLUSION

In conclusion, previous interactions Risk evaluation, which considers the borrower's prior financial contacts and activities, is essential to the process of assessing credit risk. A favorable evaluation is influenced by timely repayment, consistency, and good credit connections, while defaults, late payments, or contentious prior interactions raise questions about creditworthiness. In order to support educated credit choices and reduce prospective credit risks, effective previous transactions risk management requires detailed data analysis, strong risk management procedures, and a holistic examination of the borrower's prior behavior. Financial organizations use a variety of risk management techniques to reduce the risk from prior transactions. These might include undertaking thorough credit evaluations, confirming the borrower's information, running background checks, and using credit scoring models that take prior behavior into account as a risk factor.

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Risk Rating and Risk Measurement Models

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ABSTRACT: Risk rating and risk measurement models are essential tools in the field of risk management, enabling financial institutions to quantify and assess various types of risks they face. This abstract provides an overview of risk rating and risk measurement models, highlighting their significance, key components, and their role in effective risk management. Risk rating models are used to assign a rating or score to different risks, such as credit risk, market risk, operational risk, and liquidity risk. These models provide a standardized framework for evaluating the severity and probability of potential losses associated with specific risks. Risk ratings enable financial institutions to prioritize risk mitigation efforts, allocate capital efficiently, and make informed business decisions.

KEYWORDS: Credit Risk Models, Economic Capital, Factor Models, Loss Given Default (LGD), Market Risk Models, Portfolio Risk Analysis.

INTRODUCTION

There are two aspects to the creation of credit risk measuring models. The creation of credit risk rating models is the first step, and the creation of methods for calculating possible losses on the bank's whole credit exposure is the second. Risk rating is a tool that, when given to a counterparty or credit facility, indicates the amount of possible credit loss that may be experienced in the event of a default. The correctness of the rating is confirmed if the amount of possible loss from a rated counterparty roughly corresponds to the actual loss in the case of failure. For instance, if an obligation is given a AAA rating, which indicates very little credit risk, it is assumed that credit loss from counterparty exposures would be minimal. Therefore, banks mandate a lower lending interest rate, a lower regulatory capital weight, and a smaller loan loss reserve for AAA-rated credit exposures. The risk rating and the amount of credit loss are inversely related, with a higher rating indicating lower exposure risk and a smaller projected quantum of possible credit loss.

Only if the rating model is extremely reliable and generates accurate rating grades is it likely to be true. The rating model has to take both the counterparty- and transaction-specific attributes into account and contain multidimensional criteria. Rating criteria should take into account pertinent variables that affect the volume and consistency of the borrower's business and income, such as macroeconomic imbalances and slowdowns at home, as well as unfavorable events abroad that have an impact on international trade and

business. The rating models' drawbacks include that they often fail to account for credit losses during economic downturns and that they presume there is no connection between risk characteristics and company activity. The inadequacies of credit risk rating models should, to a large degree, be eliminated by the identification of all relevant risk characteristics [1]–[3].

Estimation of A Credit Loss Conceptual Problems

In order to establish credit risk measuring models, two key problems must be solved. What time zone will we try to quantify credit loss up to? And when should we claim that credit loss has happened or is likely to happen? The measuring method will be more difficult and time-consuming the more expansive the definition of credit loss is, and the potential credit loss will be greater. The difference between an exposure's present value and its future value at the conclusion of a selected time period is known as a credit loss. The idea of credit loss that the bank uses to create credit risk assessment models provides the exact characterization of present and future values. There are two methods that banks are using to define credit losses. One is that the loss is only considered to have happened if the counterparty breaches its repayment commitment. The other is that, even in cases where there is no default, a decline in the quality of credit exposure indicates credit loss. There are two paradigms for model selection that correspond to these two definitions of credit loss: the default mode paradigm and the market-to-market paradigm.

DISCUSSION

Default Mode Paradigm

The concept of "default" for calculating credit loss is highly important since the default mode paradigm is a two-state model with the default state and the nondefault state. Different definitions of default were provided in this section, but typically banks define default as a credit event that indicates the counterparty has failed to repay loans in accordance with the terms of the contract. In this case, the bank treats the relevant exposure as "nonperforming or nonaccrual" in accordance with standard accounting practices. According to the DM paradigm, credit losses are only recorded when the counterparty breaches a repayment commitment; otherwise, even if the credit quality may have deteriorated, there is no credit loss. The difference between the exposure amount still outstanding in the bank's books and the present value of anticipated recoveries, less all expenditures and costs associated with the recovery process, is the credit loss. The DM paradigm does not evaluate prospective credit losses from exposures when defaults happen beyond the planning horizon of one year; it only analyzes credit losses from exposures with maturities of one year or less. The loss rate given default, a random variable whose value is unpredictable and unknown at the beginning of the planning horizon, is used in the DM model to estimate the future value of an exposure.

The DM paradigm is simpler to use and more straightforward. According to the DM paradigm, the total amount of possible credit losses on all individual assets whose defaults have happened during the planning horizon are simply added together. For the calculation of probable credit losses when the planning horizon is one year, any defaults occurring after that time are disregarded. By collecting credit losses from financial instruments whose maturities are outside the planning horizon and revising the instruments' ratings, some institutions attempt to address the inadequacies. The longer-term instruments for the same client are given a lower credit rating than the shorter-term instruments, indicating a greater likelihood of default and a larger loss rate in the event of default. However, the technique may not result in a meaningful evaluation of credit loss on exposures with maturities outside the planning horizon unless additional variables like correlation factors are also taken into account [4]–[6].

Market-to-Market Thinking

The multistate mark-to-market paradigm is a model. The MTM paradigm, in contrast to the DM paradigm, acknowledges credit losses if the credit quality declines even when the counterparties have not defaulted within the time horizon. The status of the exposure in nondefault states is indicated by the declines in a counterparty's or facility's ratings to other risk grades as a result of degradation in the credit quality. The credit migration matrix also known as the MTM model requires information on both the likelihood of default and the likelihood of migration to nondefault states. According to the MTM paradigm, the credit loss is the difference between a credit exposure's value at the start of the planning horizon, or its present value, and its value at the end of the planning horizon, or its future value, both in default states and in states that are not yet in default. The credit asset is marked to the market or to the model in order to determine the future value of an exposure in a nondefault situation.

The approach for valuing an asset in different nondefault situations gains important since the MTM model recognizes the loss in the economic value of an asset in nondefault states. The discounted cash flow approach is used to determine the future values of loans or facilities that have not yet failed. Thus, in addition to the credit risk migration matrix, the MTM model also needs an additional input known as the discount factors. The risk-free interest rates calculated from the yield curve of sovereign securities papers together with the credit spreads applicable to the appropriate risk grades will be the interest rates utilized for calculating the present values of the future cash flows. The transfer of the borrower to different risk classes or changes in the credit spreads' market-determined term structure may both affect how much a loan is worth over time. Due to changes in risk ratings and credit spreads throughout the interim, the discount factors used at the start and end of the planning horizon may fluctuate. The default grade is one of the risk classes that a counterparty or a facility may migrate to under the MTM model. Discounting contractual cash flows after a default occurs is useless; instead, the future value is based on the loan's recovery value.

Mark-to-Market and Default Mode Models

For the purpose of measuring credit losses, both the DM and MTM models are used. The rating transition to all states upward, downward, and default states is significant in the MTM model, but in the DM model,

only the rating transition of an exposure to the default state is taken into consideration, and the transition to other states is disregarded. The MTM model estimates possible credit losses by taking into consideration the increases and decreases in asset value resulting from the upward and downward movement of credit ratings. Due to differences in default probability, loss rate given default, and exposure at default between risk grades, an increase in rating results in an increase in market value of the exposure and a decrease in credit loss, whereas a decrease results in a decrease in market value and an increase in credit loss in the event of a default. Both models assume that loans lose value if they are not repaid within the planned horizon, with the recovery rate serving as a proxy for the real loss.

There is a predominant two-state theory of credit loss: default or no default. The multistate idea of credit loss is predominant; credit loss may also result from a decline in credit quality without a default data on the likelihood that credit ratings may change to a default situation during the planned horizon is necessary. Need information on the likelihood that credit ratings will move from default to nondefault situations.

Even if the quality of the assets may have declined, the absence of a default within the chosen time frame indicates that there was no credit loss. Credit loss is acknowledged when a rating declines. When an asset is marked to market at the start of the planning horizon and its future value is predicted at the conclusion, the difference between the two values is the credit loss does not account for changes in asset quality over time and how such changes affect the bank's financial situation. The chosen time horizon's credit losses and their effects on the financial situation are recognized by the model. Recognizes the net effect of credit gains, credit losses, and changes in asset quality on the bank's financial situation.

Selecting a Planning Horizon

The maturity structure of loans and advances may be taken into consideration by the bank when determining the time horizon for developing an internal model for estimating credit loss. The majority of loans and advances are typically granted for a period of one year, following which the accounts are evaluated and the credit limits are extended, provided that the customer's company is operating well and that the prognosis is favorable. The limitations are terminated and actions are taken to reclaim unpaid debt if unfavorable characteristics or abnormalities in the accounts' operation are noticed. Commercial banks often have a large volume of loans with a one-year maturity, thus it

makes reasonable to use a one-year time horizon when calculating possible credit loss. Given that the majority of events related to credit administration happen within a year, a one-year time horizon is not implausible. For instance, yearly credit evaluations, risk grade reviews, and capital planning for credit development are all common. The likelihood of default of longer-term credit instruments is likely to be included in the majority of situations when assembling the data on probability of default if the research is based on a relatively lengthy time span, say, a consecutive period of five to seven years. Therefore, the choice of a one-year time zone may not significantly degrade the accuracy of statistics on the chances that medium- and long-term loans would fail.

1. The quantification of risk factors
2. Banks require information on the following inputs to estimate credit loss:
3. likelihood of default. loss rate in case of default. with default exposure.
4. tenor or maturity of financial securities.
5. Risk variables and counterparties are correlated.
6. Calculation of the Default Probability

Probability of default is the likelihood that a counterparty will break their promise to pay back the bank within the chosen time frame. Both DM and MTM models may be used to define this term. For estimating the average PD for each rating grade with regard to corporate, sovereign, and bank exposures, the New Basel Capital Accord states that "banks may use one or more of the three specific techniques internal default experience, mapping to external data, and statistical default models"¹.

The average PD should be estimated by a bank's internal credit risk assessment system using internal default data. If a borrower uses several facilities, the bank may utilize the borrower ratings obtained from the internal rating system to assemble the data on PD and estimate PD borrower-wise rather than facility-wise. To assess if a borrower is in default, all credit facilities that the borrower utilizes should be taken into account simultaneously. A borrower may be judged to have defaulted on all of the credit facilities they are using simultaneously if they default on one of the credit facilities. According to the New Basel Capital Accord, banks must estimate PD for corporate, sovereign, bank, and retail exposures separately. In order to build time series data on PD based on the internal default experiences of borrowers in each risk grade, the bank may choose the DM paradigm and a one-year time horizon. It may create a credit risk

migration matrix, including migration to the default state for use in the MTM model, using the internal credit ratings given to counterparties over time. A minimum of five to seven years should pass continuously before the bank stops producing data on PD. The bank may classify the exposures to asset pools based on the homogeneity of borrower characteristics or facility features and build up the data on a random sample basis for the estimate of PD on retail exposures. Loans to small businesses, loans to farmers or co-operative societies for agricultural purposes, loans for residential housing, personal loans, credit card debits, and other types of loans, for instance, may all be categorized independently under distinct asset pools, from which the average PD can be calculated for each asset pool.

For each asset type, the bank should gather data on PD individually in order to quantify the possible loss on the organization's overall exposure to credit. For a period of five to seven years, PD should be calculated for counterparties in each risk grade and for each asset class, with the data appropriately arranged to provide a risk-grade-wise distribution. The bank should gather PD on a portfolio basis and for each portfolio, such as the manufacturing sector, trade sector, commercial real estate sector, capital market sector, and retail sector, if it plans to use the portfolio technique to estimate credit loss. It must determine the portfolio to which the counterparty belongs, add default information specific to each portfolio, and compute average PD by risk grade and portfolio.

Calculation of the Loss Rate Under Default

The proportion of loss that the bank is anticipated to experience on its overall exposure to a counterparty in the event of failure is known as the loss rate given default. The recovery rate is the ratio of net recoveries to outstanding debts as of the date of default, and for a group of counterparties, the average recovery rate may be calculated using recoveries made in the defaulted accounts over time. The LGD is equal to 100% minus the recovery rate, hence a greater recovery rate results in a lower LGD.

Accurate LGD estimate is subject to several limitations. Credit event and borrower correlations are crucial inputs for calculating the probability distribution of LGD. However, it is uncommon to get accurate information on the association between borrowers caused by credit incidents. Credit Risk Modelling Current Practices and Applications by the Basel Committee on Banking Supervision documents that "most models assume zero correlations between

credit events of different types, although such correlations may in fact be significant" and "models generally assume zero correlation among LGD of different borrowers."

A significant obstacle to developing credit loss estimating models is the dearth of information on the relationship between credit events and borrowers. In general, LGD is influenced by the kind of customer, the type of product, the collateral backing, the seniority class, the recovery laws, the enforcement methods for the collateral, and the period until the collateral values are realized. The attitude of the borrower has a considerable impact on the values of LGD in several common circumstances. Collateral is a significant component that affects recovery rates, which may be one of the reasons the New Basel Capital Accord places focus on the calculation of LGD facility-wise.

Banks are free to determine their own LGD projections for each facility under the New Accord. LGD estimations should account for the severity of losses during times of significant credit losses, such as losses during cyclical downturns or times of economic crisis, in addition to the average economic loss during normal times. The New Accord established a set of requirements for the banks' internal estimations of LGD to be accepted. The Long-Run Default-Weighted Average Loss Rate Given Default (LGD) must be less than the Long-Run Default-Weighted Average Loss Rate Given Default computed based on the average economic loss of all observed defaults within the data source for that kind of facility, according to the Accord. ...LGD projections should not, when appropriate, be entirely based on the expected market value of the Collateral, but shall be based on past recovery rates. The computation of LGD should also account for the possibility of unexpected losses on defaulted exposures. The estimate of LGD must be based on a minimum data observation period, which 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.

Determining the approach for estimating the LGD of loans and advances involves a few considerations. The first question is whether past LGD data for bonds and debentures, which is often accessible, may be used as a substitute. The historical data on LGD of bonds may not be representative data for modeling purposes, thus the bank is not in a position to accomplish so. Due to the fact that loans and advances are often backed by cash margin, physical collateral, and third-party assurances, their features vary from those that apply to

bonds. Short-term credits, which have a one-year duration and are typically extended every year unless abnormalities emerge, make up the majority of loans and advances. Bonds, however, have a set term and a longer duration, and they often lack material collateral protection. Compared to businesses that have issued bonds, banks have better control over loan borrowers since they are subject to a clear follow-up process.

The oversight of bond-issuing businesses lacks structure, transparency, and documentation. In reality, banks whose bonds they have bought really have no authority over the corporations. Additionally, banks are able to quickly recoup the value of collateral against loans and advances since they have direct access to it. When a bond or debenture's redemption value is in default or the company is bankrupt or insolvent, a complex liquidation process is required, and the realized proceeds are allocated according to seniority class, which may not give banks precedence. These characteristics that set loans apart from bonds suggest that in a postdefault situation, the loss is likely to be, on average, less severe for loans and advances than for bonds. Therefore, it is incorrect to presume that the assessment of the LGD of loans and advances can be made using the historical LGD of corporate bonds as a proxy.

The second concern is whether to base our estimate of LGD on borrowers or facilities. Large businesses or multinational firms benefit from a bundle of credit facilities, sometimes from more than one bank or financial institution, and they also generate money by issuing bonds in parallel tranches. It is inappropriate to estimate LGD on the basis of a single credit facility given that enterprises use a multiproduct strategy to addressing their financial requirements. A borrower's financial situation has undoubtedly become worse, and if they fail on any of their credit facilities with any bank, they are likely to shortly default on all of their accounts with all of the banks. Accounting rules and bank authorities generally accept the practice of classifying nonperforming loans and advances according to the borrower rather than the facility.

To prevent a borrower from abusing the financial system by maintaining the status of a nondefaulter, 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 regardless of the health of its accounts with other banks and financial institutions. Since banks have a general lien on collateral and can set off the excess value of collateral against the dues in other accounts of the same borrower after settlement of the loan

account to which the collateral is attached, it is more appropriate to estimate LGD on a borrower basis rather than a facility basis. However, they may not be able to fully recover their dues. Given that banks have the power of general lien, it makes more sense to add the total of unpaid dues which represents the credit loss to the total of the defaulted borrower's obligations and the total of all recoveries. However, when a single kind of facility is involved, such as with residential dwelling loans, auto loans, and personal loans, facility-wise LGD is significant. As a result, it is practical and helpful to adopt a two-dimensional technique to estimate LGD: facility-wise LGD when only one kind of facility is involved and borrower-wise LGD when many different types of credit facilities are present. Thus, banks may adjust the method for estimating LGD to match the structure and makeup of the loan portfolio [7]–[9].

The third concern is: Where do we draw the line between funds that can still be retrieved in defaulted accounts and amounts that cannot? The LGD calculation is based on the assumption that, as of the date under consideration, all recoveries have been made, and the credit loss is equal to the amount of the unrecovered share of the defaulted accounts. Because of lax recovery rules, drawn-out legal processes, or purposeful default, recoveries are often sluggish, arrive in sporadic installments, and are unreliable. Commercial banks, and especially government-owned banks, frequently make full provisions for the total loan loss in the accounts of the borrowers, but they delay the loan write-off decisions in the hopes of further recoveries or to continue recovery efforts out of concern for regulatory reprimands until it is proven beyond a reasonable doubt that no further recoveries are possible. The absence of clear regulatory standards on the time of the loan write-off hinders the process even when banks desire to gather the loss distribution data from historical records. Making a clear policy that outlines the reasons and time period for choosing the recovery deadline is one method to resolve this conundrum. Everyone benefits from a clear loan write-off policy, including the general public, stockholders, and the bank regulator or supervisor.

It is feasible and reliable to compile LGD data based on prior loss experiences. The loss data should be generated from actual recoveries made in the defaulted accounts over a period of at least seven years, taking into consideration the borrower, risk level, and portfolio. The average LGD should be calculated for each type of retail asset, such as transportation loans, housing loans, credit card balances, and so forth, in the

event of small and retail loans that are combined to create an asset class. The data for modeling will be more representative the longer the observational period for LGD data collection. The extended period of time will eliminate the typical worries related to model building, such as the omission of correlation variables between borrowers/industries and the failure to acknowledge the severity of losses during cyclical downturns or economic hardship. If the observation period is long enough, the connection between borrowers in the same portfolio or between distinct portfolios and losses during economic downturns will appear in the LGD data. Since the data will be generated from real recoveries made in the defaulted accounts, the unanticipated losses will also be included. The seven-year LGD data set, which will serve as the representative LGD for calculation of possible credit loss on the bank's overall credit exposure, should be used to calculate the simple average of LGD.

Given that the data cover a period of seven years, there is a good chance that the relationship between borrowers in the manufacturing sector and those in other connected industries will be represented, as well as the severity of losses suffered during economic downturns. In a similar manner, LGD may be created for different portfolios, including those in the trade, capital market, real estate, residential housing, and retail sectors. By calculating LGD for each debtor and then putting the debtors in the appropriate asset class and risk grade, banks may create distributions of LGD by asset class and risk level. If required, a sampling approach may be used to calculate LGD with regard to retail asset pools.

Briefly stated, LGD has the following traits:

1. The proportion of unpaid debt that is lost following a default is made up of LGD. LGD is collateral-driven, although it might differ depending on the kind of exposure because of different recovery expectations. Lower LGD is triggered by high value and readily realizable collateral.
2. The risk assessment model needs historical LGD data time series data on recovery performance for at least seven years and at least one full economic cycle.
3. The bank's historical data, data from other banks, data from trade associations, public regulatory reports, and reports from rating agencies are all sources of LGD data.

Estimation of Default Exposure

In the case of a default or at the time the default happens, exposure at default estimates the anticipated amount of the bank's gross exposure to a counterparty. The New Basel Capital Accord's articles 82 to 89, 308 to 317, and 474 to 479 outline the process for estimating EAD. Banks have two options: they may adopt relatively simplified processes and establish their own estimations of EAD by drawing cues from the rules outlined in the Accord as recommended in the following paragraphs, or they can follow this approach.

The exposures of the banks to counterparties that contain credit risk fall into four categories: direct credit, credit substitution, off-balance sheet, and derivatives. Additionally, banks will be exposed by investments in other financial products that have a counterparty credit risk. Short-, medium-, and long-term credit lines make up the direct credit category. Renewable credit and overdraft limits, which are typically good for up to a year and are based on variable account balances, are examples of short-term credit lines. The consumer may choose to withdraw money up to the limit whenever they want. When a consumer is under financial stress and believes that the rating given to him or her is about to be lowered, they are more inclined to withdraw more money from the sanctioned limits. Therefore, it is fair to expect that at the moment of default, EAD will be 100% of the short-term renewable credit and overdraft limitations.

Accordingly, banks may calculate EAD for short-term credits as the total of outstanding debit balances or the sanctioned limits, whichever is higher, as of the reference date. The alternative is to estimate EAD using an average proportion of limits drawn in defaulted borrowers' operating accounts up to the date of default along with an average percentage of limitations that were undrawn and in effect. The average proportion of limits used in failed borrower accounts may be calculated by banks using historical data going back at least seven years. Banks may use information based on empirical observation, prior experience, and judgment in relation to the proportion of the unutilized section of the limits that can be added to the used portion to estimate EAD. Banks should develop EAD of short-term credit facilities according to asset type, portfolio, and risk grade in order to estimate probable losses on exposures.

Medium- and long-term loans with terms ranging from more than a year to 15 years or more are another kind of direct credit line. Typically, the term loans are drawn up to the entire amount and amortized

throughout the course of the loan. A handful of them could have just received sanction and been partially or not yet distributed. In addition to having varying maturity dates and sources of repayment, term loans are granted to consumers for a variety of reasons. Throughout the lengthy loan term, it is difficult to anticipate when consumers are likely to default. Since the majority of the term loans have already been partially repaid, the exposure will eventually be less than the total sanctioned and disbursed. As a result, banks may calculate EAD for medium- and long-term loans as the total of the debit amounts still owed in the accounts where loans have been completely disbursed and the sanctioned limits where loans have only been partially disbursed or not at all. Banks should gather information on EAD for medium- and long-term loans by asset type, portfolio, and risk grade.

The second section deals with exposures caused by banks' subscriptions to corporate bonds and debentures, which are seen as credit substitutes. These financial instruments are issued for a range of maturities, and on the maturity date, the principal and any accrued interest are due. It is logical to anticipate that the bonds' and debentures' maturity values will be the EAD. EAD is the greater of the face value or the book value for investments in various kinds of financial products and placements that carry counterparty credit risk. Banks must estimate EAD separately for each investment portfolio that has counterparty credit risk.

Banks should additionally independently estimate the EAD for the third segment, which relates to off-balance-sheet credit facilities/commitments. The committed but undrawn exposure amount multiplied by credit conversion factors, which may be assessed either using the foundation method or the advanced approach, is how banks are allowed to calculate EAD on off-balance-sheet items under the New Basel Capital Accord. The types of instruments and credit conversion factors that apply to them under the foundation approach will be the same as those that apply under the standardized approach, with the exception of commitments, financial guarantees, sale, and repurchase agreements with recourse, for which a credit conversion factor of 75% will apply regardless of maturity, excluding facilities that are unconditionally cancellable. For each facility type, such as letters of credit, commitments, financial guarantees, sale, and repurchase agreements with recourse, banks can either follow the foundation approach or make internal estimates of credit conversion factors under the advanced approach,

unless 100% credit conversion factors are applicable under the foundation approach. This is provided that the banks meet certain minimal requirements outlined in the New Accord. In order to compute EAD in relation to off-balance-sheet items that are acceptable to the bank supervisor and the external auditors, banks must set up proper systems and processes.

The fourth section discusses counterparty risk that results from exposure to derivatives. The credit risk will increase as the tenor of the derivatives contract lengthens. Banks may exclude any outstanding derivative contracts with a central counterparty, except those that were rejected by that party, when estimating EAD on derivative transactions. Based on the existing exposure technique suggested in paragraph 92 of Annex 4 of the New Accord, the bank may assess EAD for OTC derivative contracts. The current exposure method requires banks to determine the current replacement cost by marking contracts to market, which captures the current exposure without the need for estimation, and then adding a factor to reflect 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 entire replacement cost of all of its positive value contracts; and According to the New Accord's paragraph 92, "an amount for potential future credit exposure calculated on the basis of the total notional principal amount of its book, divided by residual maturities."

Banks need to estimate EAD separately for their derivatives portfolio. To sum it up: For short-, medium-, and long-term credit facilities, investment segments with counterparty credit risk, off-balance-sheet portfolios, and OTC derivatives portfolios, banks should gather data on EAD [10]–[12].

CONCLUSION

In conclusion, Models for assessing and measuring risk are essential parts of financial firms' risk management processes. These models provide a methodical way to rate risks, quantify hazards, and calculate prospective losses. These models enable institutions to prioritize risk mitigation initiatives, distribute resources efficiently, and manage risks with knowledge. Successful model deployment and trustworthy risk management procedures depend on regular model validation and a critical appreciation of model limits. However, it's critical to recognize the restrictions and difficulties related to risk measuring and rating models. These models are dependent on

past data, presumptions, and simplifications, which could not account for all facets of complex and dynamic risk settings. They are also vulnerable to model risk, which is the possibility that the methodology or assumptions used in the models may not adequately represent actual situations. In order to overcome these difficulties and guarantee the models' dependability, ongoing model validation, stress testing, and routine assessment of model assumptions are required.

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Role of Credit Risk Measurement Models

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ABSTRACT: Credit risk measurement models play a critical role in assessing the creditworthiness of borrowers and quantifying the potential losses associated with credit risk exposures. This abstract provides an overview of credit risk measurement models, highlighting their importance, key methodologies, and their application in effective credit risk management. Credit risk measurement models are designed to estimate the probability of default (PD) and potential credit losses associated with lending activities. These models help financial institutions evaluate the creditworthiness of borrowers, set appropriate risk-based pricing, allocate capital, and make informed credit decisions. Various methodologies are used in credit risk measurement models, including statistical models, structural models, and machine learning algorithms.

KEYWORDS: Credit Metrics, Default Probability Models, Discriminant Analysis, Expected Loss (EL), Loss Given Default (LGD), Probability of Default (PD).

INTRODUCTION

Credit segments and credit products are often the focus of credit risk assessment methods. The ultimate goal is to predict the amount of prospective losses from credit exposures that are realistic and near to the actual losses when defaults occur, despite the fact that modeling methodologies vary across institutions. Potential credit losses generated by models are used to calculate the amount of economic capital required to sustain all bank operations connected to credit risk. They make it possible for the bank to establish a system for pricing risk-based loans and to calculate the risk-adjusted return on capital, which serves as the foundation for assessing management effectiveness and the relative performance of different business lines. The model's output directs the bank's decisions on exposure limits, portfolio concentration, and the allocation of financial resources for credit risk. The effectiveness of measurement models is assessed based on their capacity to represent the uncertainty of potential future credit losses [1]–[3].

The availability of data on default probabilities, recovery rates in the case of default, and the connection between risk components are the main limitations in building internal credit risk assessment models. The other limiting constraints are the lack of a secondary market for loans and the availability of sufficient data for model validation and back-testing. Because credit-related instruments are rarely often traded, it is impossible to accurately estimate their current values or the rate of value deterioration. Another obstacle to creating credit risk assessment

models is the lack of a thorough archive of previous credit instrument values over a longer time horizon.

Critical inputs for the construction of credit risk assessment models include the definition of credit losses, the decision of the planning horizon over which the credit losses are to be quantified, the drivers of loan values, and the handling of credit-related optionality. The DM paradigm and a one-year planning horizon are the simple but valid assumptions that may be made in order to calculate credit loss. The majority of the time, potential credit losses are likely to be higher under the DM model than under the MTM model because, in the latter case, potential losses on exposures that improve in quality and are upgraded during the planning horizon are partially offset by increases in the quantum of losses on exposures that are downgraded and lose quality. 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. In the DM model, the current value and the future value of a nondefaulting loan are equal to its book value. Both the DM and MTM models assess the loss in the value of a defaulted loan on the basis of loss given default rates.

DISCUSSION

Internal Model Estimation of Expected Loss

In line with the technique recommended in the New Basel Capital Accord, banks are free to develop their own models for the calculation of probable credit loss on the entire exposure. In paragraphs 375 to 379 and

471, the latter discusses in great detail the methods for estimating losses for various asset types, both under the Standardized and Internal Rating-Based Approaches. Commercial banks may use a streamlined method to determine anticipated and unexpected losses by taking their cues from these recommendations. The anticipated loss, which is derived as the product of PD, LGD, and EAD and stated in percentage terms, is the total of all possible losses on all exposures that entail counterparty risk or credit risk. The average PD, LGD, and EAD values for each portfolio and risk grade for all nondefaulted exposures should be collected by banks. They should then determine the projected loss for each portfolio on nondefaulted exposures and add the losses to get the total possible loss. Based on the likelihood of a recovery, they should separately assess the probable loss on defaulted exposures conservatively and leave a safety net to cover unforeseen losses. It is anticipated that the average values for PD, LGD, and EAD compiled from the bank's internal loss experiences based on an observation period of seven years or more will be representative if the risk factors related to economic slowdown, industry correlation, and maturity of the instruments are included in the credit risk rating models. Additionally, if models are periodically verified and back-tested by contrasting model-generated anticipated losses with actual losses, the models' dependability is proven. The estimated loss is calculated using the following formula:

Here are some descriptions of EL's characteristics:

1. The total credit loss an institution will anticipate on all exposures including credit risk during the selected time horizon.
2. EL, which fluctuates from year to year, stands for average loss expectation. EL is the initial and additive level of loss estimate.
3. To determine the portfolio EL, EL may be computed for each borrower or each facility in the portfolio.
4. For both non-defaulted and defaulted risks, EL must be independently calculated.
5. Economic capital, risk-based loan pricing, and provisions for loan losses are all calculated using EL as an input.
6. For a certain portfolio, the projected loss on nondefaulted exposures is calculated in 12.5. It serves as a simple illustration.

DM-Type Model

In 12.5, PD and LGD refer to the portfolios that have been constructed using information about specific

borrowers. No of the risk level, EAD has been assumed to be 100% for cautious estimations. Assuming the bank has exposure to short-term credit that includes U.S. The EL under the DM model is calculated as US \$98.96 million or 1.98 percent of the overall short-term credit exposure in the manufacturing sector, which is \$5.00 billion. The portfolio's average PD and average LGD were determined using real default and actual recovery on short-term loan limitations that are recorded in the bank's records. Concerns about the likelihood of increased defaults and lesser recoveries during economic stress times are allayed by the assessment of PD based on five years of real default cases and LGD based on seven years of actual loss data. The correlation and credit concentration elements are also very well taken care of by the long-term data. Since PD and LGD data are gathered annually, the bank will have a more complete collection of data if the observation period is 10 years or longer [4]–[6].

Estimation of Unexpected Loss Using Internal Model

The EL is the portfolio's mean or average loss over the selected time horizon for the bank's credit. The amount by which the actual loss exceeds the EL is the unexpected loss. The losses in respect of certain borrowers will be considerably more than the model-calculated EL based on the average of PD and LGD since the PD and LGD at some point in time or with respect to particular exposures may significantly surpass the average PD and LGD estimated on a historical data basis. Consider the situation of a borrower who has been granted a \$100 million US short-term credit limit by the bank. Let's say the borrower's most recent risk rating is BB. 12.5 s that the bank's exposure to borrowers with BB ratings will have an average EL of 0.29 percent. Since the loan limit is entirely tapped as of the day of default, the EL that the bank anticipates for the borrower will be US \$0.29 million, or US \$290,000. Consider a scenario in which the borrower truly fails on paying its debts and the bank is only able to recoup US \$80 million. The UL in the current scenario is the difference between the actual loss of US \$20 million and the model-estimated EL of US \$0.29 million or US \$19.71 million. The bank may then calculate the portfolio's UL based on standard deviation and compute s of UL for a sample of borrowers in each portfolio in this manner. Through portfolio-wise UL, it is possible to estimate the UL on the bank's overall credit risk. UL develops as a result of variations in PD and LGD

values, and it may sometimes be rather big. Here is a list of UL's characteristics:

1. The difference between actual and anticipated losses is known as the upper limit (UL).
2. UL is a metric for EL's surrounding volatility.
3. The PD and LGD value fluctuation has the most influence on UL.

The formula for calculating the manufacturing sector portfolio's short-term credit exposure level. Using counterparty- and facility-specific PD and LGD data, banks should compute EL and UL separately for medium- and long-term credit exposures for each portfolio. For off-balance-sheet portfolios and derivatives portfolios, they should independently assemble PD, LGD, and EAD data in order to compute EL and UL. The prospective EL and UL for the whole bank will be calculated as the sum of EL and UL for all exposure types and portfolios.

Testing of Credit Risk Models in the Past

Validation is more crucial for the credit risk model than the market risk model since the correctness of the credit risk model is more likely to have an impact on a bank's financial stability. Due to the fact that certain credit instruments cannot be marked to market because there is no demand for them, substantial losses may amass in the banking book unreported or untreated. Because the size of the banking book of commercial banks, which is the largest source of credit risk, is significantly larger than the size of the trading book and the time horizon for modeling credit risk is significantly longer, the validation of the credit risk model is more complicated than that of the market risk model. For market risk modeling, one to two years' worth of volatility data on market variables may be sufficient, but historical data gathering spans many years to derive values of model inputs for credit risk assessment. The purpose of back-testing is to ensure that the model has performed as predicted and that the ex-ante estimate of credit losses is consistent with the ex post actual losses. For streamlined domestically generated models, the back-testing procedure must be used in three key areas:

correctness of the risk grade given to a borrower, accuracy of the PD and LGD estimates made based on the risk grade, and accuracy of the EAD of various exposures. The bank must confirm that, in light of the borrower's current financial situation, the behavior of the accounts, and the current risk perception, the ex-ante assumptions on the financial and nonfinancial risk factors used in borrower ratings were still true in the ex post period and that the risk grade assigned was

appropriate. For instance, the credit event would not be compatible with a AAA rating if a borrower had received such rating two years earlier and has since defaulted on its obligations to the bank. The risk grading process has to be reviewed in light of the discrepancy between risk grade and projected default likelihood. Likewise, the approach used for predicting PD, LGD, and EAD has to be looked at, and the process appropriately adjusted, if the model-generated predicted and unexpected losses are significantly different from the actual losses. Based on historically calculated average values of PD, LGD, and EAD within the DM paradigm, this form of back-testing is suitable to credit risk measuring models created internally by banks. Back-testing involves the use of a wide range of assumptions and data when it comes to complex MTM models, which make use 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. Sometimes the lack of trustworthy data makes it impossible to back-test MTM models.

Credit Portfolios Under Stress

Stress testing is a method for determining how vulnerable a bank would be to certain unfavorable but probable occurrences or materially unfavorable changes in financial factors. The results of stress tests determine how much of an impact economic shocks and other stressful conditions will have on the bank. The bank may use this information to determine how important but conceivable occurrences will affect its loan portfolio, profitability, and capital. Instead of focusing on daily fluctuations in risk parameters, the bank should focus on the large movement of economic and market factors that might occur while performing stress testing. Various realistic stress scenarios with varying degrees of severity are utilized to perform stress tests, and the findings are used to define risk ceilings, allocate capital, manage risks, and create backup plans.

The bank must first identify the main sources of uncertainty in the credit risk modeling process before selecting the important variables that will be put to the test. The uncertainties could, for instance, be connected to circumstances that have a major impact on the values of PD, LGD, EAD, or the combined probability distribution of risk variables. Unfavorable economic events and fluctuating interest rates and currency exchange rates have a substantial influence on borrowers' ability to repay loans, which might result in an exceptional rise in the number of

nonperforming loans. These kinds of occurrences result in bigger defaults and provide PD and LGD values that are much higher than those predicted by the measurement models. The bank should conduct stress tests on the credit portfolio under the assumption that the proportion of nonperforming loans grows, assess the effect on the financial situation, and implement the necessary corrective actions. The bank should also do stress tests in relation to changes in credit spreads, corporate bond spreads, swap spreads, declining credit ratings, shifting default probability, and so on. The bank should conduct stress tests on its commercial real estate portfolio in light of potential collateral value declines, its exposure to the capital market in light of bond and equity price volatility, and it should consider various scenarios that could result from a decline in property and equity prices.

By assuming country-specific stress variables, it is also required to perform stress tests of credit and investment exposures in other nations. In order to determine the appropriate course of action for each scenario, banks should conduct stress tests on the pertinent financial parameters at intervals determined by the business mix and risk-bearing capability, at least at three levels of escalating severity (small, medium, and major). The two major methods used to carry out credit portfolio stress assessments are sensitivity tests and scenario tests. Sensitivity tests are used to evaluate the effect on a portfolio's value of a series of preset changes in a certain risk factor. The goal of scenario analysis is to evaluate the effect that simultaneous negative changes in a number of risk variables will have on the portfolio's value. Scenario analysis is based on hypothetical occurrences that are believed to be probable under certain foreseeable conditions but for which there are no specific historical analogs as well as historical events that have already occurred and the possibility for repetition [7]–[9].

A scenario can be a rapid economic downturn that has a substantial impact on the loan portfolio. Three shocks result from a quick economic downturn: a lowering of borrower ratings, a moving of advances and loans from performing to nonperforming status, and an increase in loan loss provisions. By altering the intensity of the event and analyzing the effect on its profits and capital, the bank should carry out stress tests with reference to each of these metrics. In order to formulate a credit risk policy and establish credit risk limitations, the bank should regularly examine the methodology used and the severity levels assumed for stress testing, identify the concerns that arise from the

results of the tests, and take those issues into consideration.

Banks should create credit risk assessment models to calculate possible losses and credit risk rating models to indicate counterparty risk level. Models should account for credit losses during economic downturns and take into account the relationship between risk variables and company operations. Banks should choose the time zone to assess loss and establish an acceptable definition of credit loss. The measuring method will be more difficult and time-consuming the more expansive the definition of credit loss is, and the potential credit loss will be greater. The risk rating indicates the expected amount of credit loss that might result from the credit exposure in the case of default after the rating is issued to a counterparty or a credit facility. Risk rating and credit loss amount have an inverse relationship. The amount of possible credit loss is lower the better the rating is.

Banks are using two definitions of credit loss. One holds that credit loss only happens when the counterparty fails, while the other that credit loss happens whenever the credit quality declines, regardless of whether a default occurs within the chosen time period. The default mode paradigm and the mark-to-market paradigm are the two sorts of paradigms for model selection that correspond to these two definitions of credit loss.

The default state and the nondefault state are the two states in the default mode paradigm. The mark-to-market paradigm is a multistate model that, in the event that credit quality declines, acknowledges credit losses prior to default. In most cases, the default mode paradigm results in more potential credit losses than the mark-to-market strategy. Based on internal estimations of default likelihood, loss rate given default, and exposure at default, banks may create simple credit risk measuring models. PD refers to the potential for a counterparty to breach its commitments within a certain time frame. EAD stands for estimated gross exposure at the time of default, while LGD is the proportion of unpaid debt that is lost in debtors' accounts following a default. For each asset class, each portfolio, and each rating grade, credit loss estimate models call for the inputs PD, LGD, and EAD.

The biggest barrier to creating internal credit risk assessment models is the lack of credible recovery data, default probability data, and obligor and risk factor correlation data. The additional restrictions include the lack of a secondary market for loans, the inaccessibility of market values for instruments connected to credit as well as past credit instrument

prices over a longer time horizon. The predicted and unexpected losses that the credit risk model produces are used as inputs to establish exposure limits, optimize portfolio concentration, choose risk-based loan pricing and provisions against loan losses, and decide capital allocation.

Expected loss, which is determined as the product of PD, LGD, and EAD and presented in percentage terms, is the total of possible losses from all exposures that entail counterparty credit risk. Unexpected loss, which results from variations in the average values of PD and LGD, is the amount by which actual losses exceed projected losses. To check if the ex ante estimate of credit losses is consistent with the ex post actual losses, banks should back-test their internally designed credit risk measuring models. They should also do stress tests on credit portfolios at three progressively more severe levels minor, medium, and major in order to identify possible vulnerabilities under extreme but realistic conditions and implement the necessary safeguards.

Credit Risk Control

Since credit risk is present in all of a bank's primary operations, proper management of it is essential for long-term solvency. Maintaining the quality of credit assets and preventing standard advances from falling into the nonperforming category are the key goals of an efficient credit risk management system since the latter has an impact on the bottom line. Although nonperforming advances are not profitable, the bank must pay the cost of keeping them and make significant provisions for potential loan losses.

The goal of credit risk management is to maintain credit quality over time and monitor 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 is concerned with the quality of credit prior to default. Thus, credit risk management primarily focuses on sound lending practices to reduce the likelihood of default and on taking prompt action to stop the decline in credit quality far in advance of actual default. Under the risk-based approach to bank supervision, bank supervisors continue to give the management of credit risk their full attention.

Credit Risk Management and Management of Credit

Credit management refers to the whole credit administration process, from the first credit issuance through the final credit recovery. It includes

authorization, payment, oversight, follow-up, and credit recovery. The risk the bank suffers from credit exposure up until the borrower relationship is ended, on the other hand, is the focus of credit risk management. In order to optimize the risk-adjusted return on credit exposures, it is important to maintain risk within reasonable bounds. The level of risk that the bank will take on from exposures must be in line with the bank's credit risk management policy. Credit risk management does not handle issue loans or loans that are late on payments since it primarily deals with the risk from exposures before they reach the stage of default. The main goals are to maintain the quality of credit exposure, reduce the likelihood of default, and maintain the possibilities of recovery until the borrower and lender have ended their relationship. Credit risk has manifested and losses on the credit exposures will occur sooner or later when borrowers miss on paying their debts to the bank and the loans go bad. The goal of credit risk management is to create processes that make it easier to choose safe exposures and keep credit quality high. When the portfolio's or an individual credit's quality starts to decline, the processes should immediately alert the user so that corrective action may be taken in time to avoid default and, in the event that default does occur, to reduce losses.

The whole credit management process includes credit risk management. The second has a considerably wider scope, while the former is a tool for managing credit loss. The likelihood of defaults and the amount of credit risk rise when credit management is inadequate. Credit management includes all facets of borrower selection, margin money availability, collateral support, efficient use of funds, observance of financial restraint, and borrower adherence to payback schedule. It involves the bank's oversight of the borrowers' actions and accounts. Credit risk management, on the other hand, aims to reduce the frequency of risk materialization and the severity of credit loss through the establishment of standards for credit selection, diversification of the credit portfolio, avoidance of credit concentration, prescription of prudent exposure size limits, development of models for risk quantification, and prescription of risk mitigation strategies. While credit risk management focuses on lowering the likelihood of default, credit management focuses on enhancing recovery chances. Tools for managing credit risk are more complex and advanced than those for managing credit.

Management of Credit Risk

Approach

In the whole risk management process, the methods and practices for controlling credit risk assume the largest relevance. As opposed to those from which market risk comes, sources of credit risk are more varied. This is due to the fact that numerous employees working in many places within a company are given authority to award credits, but individuals who do treasury and trading tasks that increase market risk are small in number and only work in certain locations. Thus, there are many more sources and sites where credit risk might develop. As a result, the strategy for managing credit risk should take into account the issues caused by the plurality of people handling credit as well as the multiplicity of operational locations where credits are provided. The breadth of operations, corporate strategy, complexity and variety of credit delivery products, as well as the staff's proficiency in handling credit products, all have a significant role in the choice of credit risk management technique. A number of additional factors, such as the approach's structure and level of capital, business focus, the intensity of peer competition, customer product preferences, related party lending policy, the availability of trained personnel for credit administration, and management confidence in the staff members engaged in credit monitoring and control, all have an impact [10].

The following actions are taken by banks to set up a thorough credit risk management procedure:

1. Creation of credit risk strategies and procedures. creation of a framework for assessing credit risk.
2. Creation of models for measuring credit risk. risk management for a portfolio.
3. Management of interbank exposure credit risk. management of credit risk in exposure outside the balance sheet.
4. Controlling country risk in international loans and investment. creation of credit risk reduction techniques.
5. Creation of procedures for monitoring borrower rating migration. creation of procedures for loan review or credit audit.
6. Establishing a way to evaluate capital return after accounting for risk.
7. Creation of a capital allocation strategy for credit risk.
8. Creation of a pricing strategy for loans.

CONCLUSION

In conclusion, Credit risk assessment models are essential tools for financial organizations to evaluate creditworthiness, calculate possible credit losses, and forecast default probability. Credit risk assessment methods include statistical models, structural models, and machine learning algorithms. These models support strategic portfolio management, risk reduction, and credit decision-making. Models should be created using solid data, constantly verified, and modified to account for changing market circumstances in order to guarantee their performance. Credit risk measuring tools provide insightful information, but it's crucial to recognize their limits. Models may not accurately represent uncommon or unanticipated occurrences since they are dependent on previous data and assumptions. There are continual issues with model risk, data quality, and model validation that call for attention and constant development.

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Establishing Credit Risk Environment

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ABSTRACT: Establishing a robust credit risk environment is crucial for financial institutions to effectively manage and mitigate credit risk exposures. This abstract provides an overview of the key components and considerations involved in establishing a credit risk environment, emphasizing the importance of sound governance, comprehensive policies and procedures, data management, and risk culture. A strong credit risk environment begins with clear governance structures and accountability. It involves defining roles and responsibilities, establishing risk management committees, and ensuring adequate oversight of credit risk activities. The governance framework should facilitate effective decision-making, communication, and escalation of credit risk issues.

KEYWORDS: Enterprise Risk Management, Internal Controls, Key Risk Indicators (KRIs), Portfolio Analysis, Risk Appetite, Risk Reporting

INTRODUCTION

A document including the bank's credit risk management strategy, credit risk rules, and tolerance levels for credit exposures should be available. The senior management is in charge of creating the processes for carrying out the policies and plans, and the bank's board of directors has the major duty for approving this document. In accordance with these policies and strategies, the bank expands its loan portfolio while attending to the following operating needs:

1. What kinds of credit exposures will the bank tolerate, and what exposure mix should it accept in accordance with its capacity for risk tolerance and its risk-return trade-off strategy in order to maximize profits?
2. What should the maximum exposure to each economic sector be, as well as the target economic sectors for loan issuance? What should the geographic distribution of loans be between the domestic and international markets?
3. What should be the regions of credit diversification and what should be the amount of credit concentration in certain sectors? The target markets are where?
4. Given the bank's liabilities profile, how should credit be distributed in terms of currencies and maturities?

The board of directors must to outline the procedures for approving credit, carry out an impartial assessment of credit risks, and delegate precise duties for credit management. Implementing rules and processes for the grant and conduct of credit is the area of credit

management that is most susceptible to errors and aberrations. The top management should establish written guidelines for credit sanction, as well as assign roles for reviewing credit history, identifying problematic debts, and monitoring and managing credit risk. This document should include the steps for establishing exceptions, allowing for excesses, and reporting.

The implementation framework should handle nation risk and transfer risk of cross-border credit exposures as well as credit risks in all goods and activities. Before introducing new goods, the framework should outline the steps for credit risk detection. It should delegate the duty of conducting yearly evaluations of the bank's credit-granting and credit-management operations. Effectively communicating credit risk policies and strategies across the company in a way that guarantees staff members have a clear grasp of the whole process with a view to complying to the established criteria of credit sanction is the most challenging component of implementation [1]–[3].

DISCUSSION

Operating Under a Sound Credit Granting Process

Customer selection, money distribution, and supervision, monitoring, and follow-up processes are all crucial components of credit operations. The bank specifies standard terms and conditions for the loan rate, minimum margin, collateral coverage, and tenure as well as entry-point requirements for credit approval. It should contain a set of application forms for gathering all pertinent information about the borrower in order to conduct an extensive risk profile analysis.

It should provide standardized risk profile templates, which should contain all variables important to credit decision-making, for the calculation of borrowers' credit risk ratings. However, the risk rating merely indicates the degree of risk related to the exposure to credit, which is insufficient for credit choices. The borrower's ability to repay the loan and the credit's intended use are more vital, and the credit's self-liquidating nature is essential to making wise credit selections. Therefore, it is essential to evaluate the borrower's creditworthiness without reference to the rating. A low risk rating does not always imply that the credit will be paid back in whole and on schedule. It is incorrect to base credit decisions only on the strength of collateral and guarantees, even while credit sanction rules may require borrowers to furnish collateral and guarantees in order to reduce credit risk.

Establishing credit connections requires a similar level of importance for the "Know Your Customer" approach. Even if the borrower is well-known to the bank and has a good reputation in the community, it is still important to conduct an independent evaluation of the borrower's creditworthiness and the sincerity of the reason for the loan request. Even if the exposure is of high caliber and is very lucrative, it is prohibited to give credit to people or organizations for unlawful activity. The bank shall not take solace from the credit analysis performed by the lead bank or lead underwriter for accepting a share if it chooses to join a consortium or a syndicate for the award of a loan. Instead, it ought to do a separate evaluation of the loan, just as it would have if it had been the borrower's only lender.

The bank must create maximum exposure limitations in respect to its capital funds in order to build a reliable credit operation method. The bank should describe the maximum exposure limits for a single counterparty as well as for groups of linked counterparties and clearly explain the process to identify the connected counterparty and related party in accordance with the regulatory prescription and the risk tolerance capacity. Banks must define "large exposure" and establish a large-exposure limit relative to their capital funds, according to regulations. In order to adhere to the "single-borrower" and "group-borrower" exposure rules, the bank should implement methods for aggregating exposures to specific counterparties across all business operations and exposures to the group of related counterparties.

The credit operation procedure includes credit risk reduction via the acceptance of collateral and financial guarantees. The bank should create rules for accepting

and managing collateral and mitigating credit risk. The two most popular types of collateral are tangible assets, such as mortgages on real estate, equipment, and residential property, as well as guarantees from people or organizations. Collateral protection against credit exposures certainly lowers credit risk, but it shouldn't be the primary factor in deciding whether to provide credit. Despite providing protection against credit losses, collateral assets are vulnerable to value deterioration and difficult enforcement processes.

The Basel Committee on Banking Supervision has stated 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 establish a structure of delegated powers for credit sanction, define functional responsibility for credit origination, credit analysis, and credit approval, and conduct rigorous scrutiny of loans to related parties. Additionally, they should establish guidelines for permitting exceptions and concessions by authorized authorities as well as methods for credit renewal and augmentation at certain intervals.

Keeping A Proper Credit Administration Process in Place

A credit administration procedure should be established by the bank in accordance with its size, credit turnover, clientele makeup, product variety, and complexity. The identification of the borrower and approval of credit are the first two steps in the credit administration procedure, which concludes with account closure. To protect the credit quality throughout its life cycle, there are a number of intermediate measures. The credit administration process doesn't end with the sanction or the financial commitment; it must also manage the future events if risks are to be avoided.

The creation of legally binding documents, completing the necessary steps to establish a charge over collateral, monitoring the final use of credit, ensuring that the borrower complies with the terms of the sanction and financial discipline, and conducting follow-up and credit supervision are the main tasks involved in the credit administration process. The borrower often takes adequate credit use for granted and skips the process associated with credit disbursement, which increases the risk of default. The likelihood of default is highly correlated with credit abuse. Since activity changes as a result of credit diversion, misuse undermines the purpose for which credit is issued and modifies the stream of revenue

production and cash flows. So, monitoring the borrower's proper use of money is an essential part of the credit management process.

Credit administration is made easier by routinely updating borrower-related records, such as the loan agreement and other associated papers, financial statements, and company status, and storing those data and specifics in the management information system. The health of the bank's credit profile is guaranteed by balanced credit growth, constant attention to the makeup of credit portfolios, avoiding credit concentration, and routine portfolio examination.

The Establishment of a Credit Risk Control Mechanism

To effectively manage credit risk, a strict control system must be established to monitor and manage credit risk throughout the bank, including risk originating from related divisions. The internal review and reporting system, authentication method for approving exceptions, and suitable checks and balances mechanism are all included in the control framework. The control framework also includes an independent examination of the credit administration process. The role of controlling credit risk should include checking for adherence to internal prudential limitations, loan sanction requirements, and authorized credit policies and strategies. An essential step in the credit management process is the quick identification of problematic debts. A robust mechanism should be included into the monitoring and control system to quickly detect issue credits so that the bank can develop measures for debt relief and restructuring.

Role of a Bank Supervisor

The quality of the credit risk management systems used by commercial banks and other financial institutions is a unique responsibility of bank supervisors. The supervisors should establish the benchmarks that banks must meet and the criteria by which their examiners will evaluate the effectiveness of the credit risk management system. The amount of resources that banks typically invest in creating a strong credit risk management system depends on the significance that bank supervisors place on it and how seriously they treat their evaluation of its efficacy. The regulators impose the credit exposure restrictions within which they anticipate banks to function. These recommendations should at the very least set appropriate limitations on credit concentration, related party exposure, sensitive sector exposure, substantial exposure, single borrower and borrower-group

exposure, and single borrower and borrower-group exposure. The supervisors are required to assess the bank's processes for credit risk identification, measurement, monitoring, and management. The banks' credit risk management systems should be frequently reviewed to find any flaws and start implementing bank-specific procedures. The internal capital adequacy assessment procedure used by the banks to address credit risk is subject to evaluation by the regulators [4]–[6].

Organizational Structure For Managing Credit Risk

For an objective evaluation, effective monitoring, and management of credit risk, the organizational structure must be acceptable and the relationships between departments must be understood. To prevent conflicts of interest, the structure must adhere to the functional segregation standards. Since managing credit risks and administering credit are two different tasks, they should be kept functionally separate. Nevertheless, credit risk management cannot be seen in a vacuum. As part of the integrated risk management process, the organizational structure should coordinate the credit risk, market risk, and operational risk management functions in addition to recognizing the necessity of maintaining proper links between the credit administration and credit risk management functions. In order to create an effective organizational structure for credit risk management, a top-down strategy is more practical. The functions of permission, coordination, execution, and reporting are all covered by the top-down methodology. The operational staffs at the field level are the reporting units, middle management is the implementing unit, senior management is the coordinating authority, and the board of directors is the approving authority.

Section 4.5 of this book's chapter 4 provided the organizational structure framework for risk management. The first layer of the organizational structure is made up of the bank's board of directors, and the second tier is made up of the board's risk management committee. The board and its committee are in charge of all aspects connected to operational, market, and credit risk management and have major duties in this area. The board's primary duties include approving credit risk policies and strategies, setting credit risk exposure limits and standards, allocating capital for credit risk, and periodically assessing the effectiveness of the credit risk management system.

The credit, market, and operational risk management operations are intended to be coordinated by the risk

management committee, an outgrowth of the board and a group of professionals with exposure to risk management approaches. The committee, which is made up of a small number of board members and the bank's senior executives, is in charge of approving credit risk management policies and strategies, as well as systems and processes, and credit risk assessment models.

The chief executive officer, executive directors, and departmental heads are the only members of the credit risk management committee, which is the third tier of the organizational structure. The chief economist is responsible for analyzing the macroeconomic environment, political environment, government policy initiatives, and developments in the external sector, as well as advising the bank on the qualitative aspects of credit growth. The credit risk management committee will serve as the implementing authority for credit risk policies and strategies as well as the recommending authority for the creation and revision of credit risk policies. The committee will establish guidelines for loan acceptance and the use of loan sanction authorities. It will also make suggestions for setting exposure limits, developing loan pricing and loan provisioning policies, and approving credit management techniques.

The bank's whole credit risk management operations should be handled by one department in the corporate office, which should consolidate the credit risk management function. The necessity for the bank to establish a distinct credit risk management department is not due to the volume of credit activity, but rather to the function's complexity. Specialists in risk planning, risk analysis, risk assessment, and credit management systems and processes should make up the credit risk management department. The department will supervise the adoption of credit risk management systems and procedures throughout the business, build credit risk models specifically for the bank, monitor credit quality, and organize credit audits in addition to provide support services to the higher-level committees.

Appetite for Credit Risk

The degree to which the bank is able and willing to assume risks in relation to credit and credit-related exposures during regular business operations is known as its credit risk appetite. In numbers, it refers to how much of a credit risk the bank is ready to take on without compromising the benchmark capital level. The bank's goal capital level for medium-term maintenance and its credit risk policies and initiatives

both influence the risk appetite. A bank with a high risk appetite will be more likely to accept high-risk loan offers than a bank with a moderate or low risk appetite since it will have better capital strength and the potential to generate more capital. The bank then exercises the check by establishing uniform risk limits throughout the company, which serve as the foundation for capital planning against credit losses, after determining the amount of credit risk appetite for continuing its credit operations. To determine its credit risk appetite, the bank should consider regulatory requirements, targeted credit and profit growth, desired portfolio composition, the risk-return matrix, targeted markets, regions, and customers, the basket of credit products, credit processing capacity, and credit delivery strength.

Credit Risk Strategies and Policies

Credit Risk Perspective

The development of the credit risk policy requires a statement of the credit risk vision. The vision must be in line with the bank's medium-term objectives and outline the specific loan products and tenures that it plans to focus on. The bank may have a focus on corporate finance, wholesale financing, real estate finance, import-export finance, or retail finance, or it may want to extend its reach internationally and provide all sorts of credit. A suitable vision aids the bank in maintaining a balanced credit portfolio at all times for the optimization of risk and return. Credit risk vision is influenced by the variety of credit activities and the choice of loan tenures. An optimum combination of credit exposures in terms of economic activities, objectives, tenure structure, customer size, company locations, and counterparty risk profiles constitutes a balanced credit portfolio. The credit risk vision should be built around a few guiding concepts that encourage credit operation stability and deter rash and aggressive credit development [7]–[9].

The fundamental guidelines for controlling credit risk should be included in the credit risk vision document. Here is a proposed format for the document.

1. Proactive and adaptable credit risk management methods and practices are required.
2. Each year, credit expansion must correspond to resource growth, and an undue reliance on borrowed money to finance credit must be avoided. At all times, the credit portfolio must be maintained diverse.
3. Since acquiring long-term credit assets via short-term resources is plagued with liquidity risk, financing risk, and interest rate risk, the

- percentage of long-term exposures to short-term resources should be reduced to an absolute minimum.
4. Limits on individual and collective borrower exposures, big exposures, and sensitive sector exposures must be compatible with regulatory requirements and the bank's capacity to assume risk.
 5. Exposure totals to a single borrower or borrower group that exceed the established restrictions must stay under the significant exposure cap.
 6. All areas of the company must adhere to uniform standards for credit generation, processing, sanctioning, and monitoring. Documentation, collateral management, and risk mitigation techniques must all be standardized.
 7. To increase the transparency of credit decisions, many layers of credit approvers for big exposure, high-risk exposure, and long-tenure exposure must be in place.
 8. When transaction risk rises and credit ratings decline, the amount of authority to sanction credit must be larger than normal.
 9. Credit concentration should be maintained to a practical minimum in terms of geography, industry, and clients. In terms of competitive advantages and product specialization, the concentration must be justified.
 10. Each borrower or facility above a certain exposure size should be given a rating under an internal credit risk rating methodology. If there are many borrowers but just a modest amount of exposure for each borrower, separate ratings may not be necessary. Instead, minor credits could be grouped together based on the same borrower traits or credit aims and given fixed ratings on a cautious basis.
 11. According to the principles of risk-return optimization and risk-bearing capacity, credit exposures must be fairly allocated across various risk classes.
 12. A flexible risk-based loan pricing strategy must be in place to treat different borrowers differently depending on their risk profile. Rates for loans must be set in line with risk assessments, with a few deviations allowed for commercial reasons or because of market pressure.
 13. Credit audits must be conducted on credit assets on a regular basis to guarantee their health. Credit management must include monitoring credit, identifying early warning signs, and taking timely remedial action.
 14. To identify risk concentration and evaluate deterioration in credit quality, routine portfolio analysis and rating migration analysis must be performed.
 15. To reduce the likelihood of loan defaults, a consistent strategy to identifying issue exposures must be used, and swift remedial action must be taken.
 16. For the purpose of granting and managing credit, a strict system of checks and balances must be put in place. The functions of credit risk monitoring and credit approval must remain separate.
 17. The management information system must be updated frequently in order to quantify and track the credit risk associated with both on- and off-balance-sheet operations.
 18. The management information system must provide sufficient data on significant exposures, credit portfolio composition, distribution of risk by risk grade, credit concentration, and default occurrences.
 19. The credit management schedule must include individual borrower evaluations, biannual and yearly industry performance studies, occasional visits to borrowers' facilities and business locations, and quarterly management assessments of issue credits.

Credit Risk Management

The loan policy provides an explanation of the tactics to be used for executing the credit risk policy and identifies the areas of emphasis for the year's growth in credit. The credit risk policy includes the whole spectrum of credit risk-related operations. The economic activities, business lines, market segments, and geographic regions in which the bank plans to focus over the next few years are all described in the credit risk policy. The policy specifies entry-point norms, portfolio composition, lending limitations, exposure limits, and other criteria as well as preferences for customers and products.

The right composition of the loan book should be shown in the credit risk policy based on credit risk appetite and capital planning that is advantageous over the long term. The bank outlines in the policy its plans for expanding loans and changing the portfolio's composition in light of the new situation. The direction of credit over the short term, the conditions of accepting credit, the distribution and diversification of credit, and the methods and practices for managing credit are all covered by loan policy. It deals with

entry-exit prescriptions, scheduling and restructuring requirements, sector- and industry-specific limitations, and management of non-performing loans. Credit risk policy is complemented by loan policy.

The bank's risk-bearing capability and developments in the market dictate annual modifications to the credit risk policy. The policy directs the field representatives as they manage the bank's credit operations and dissuades them from engaging in risky and irrational lending. The goal of the credit risk policy is to preserve the liquidity and profitability of credit operations while keeping the interests of the depositors in mind. It is not only to control credit within the boundaries that are set. When translated and used across the bank, the policy prescriptions make sure that the potential loss from the whole credit risk, which includes anticipated and unexpected losses, is quantitatively contained within the capital allotted. The bank's credit risk appetite and the degree of the risk-return trade-off in lending operations are revealed by the credit risk policy.

Corporate governance laws mandate that banks do business in a safe and ethical manner and preserve decision-making openness. The credit risk policy helps the bank adhere to the rules of corporate governance. The policy outlines the target markets for lending, risk-grade-based credit acceptance limitations, credit origination and administration processes, and the authority and duties associated with credit approval. The policy outlines standards for portfolio management, impaired credit management, and recovery management in addition to methods for assigning risk ratings to borrowers. The policy should outline the duties that will be assigned to authorized authorities for the identification, measurement, monitoring, and management of credit risks in both on- and off-balance-sheet items [10]–[12].

The present economic forecast, potential changes to monetary and fiscal policies, and the state of the economy and business climate should all be taken into account by the bank when determining its credit risk policy. The internal audit, risk review, and risk assessment activities must be independent, and the committee approach to big credit approval is one of the main conditions prescribed by the credit risk policy to guarantee the integrity of checks and controls.

CONCLUSION

In conclusion, it takes a mix of excellent governance, extensive rules and procedures, efficient data administration, a strong risk culture, reliable risk

assessment processes, and open reporting to create a stable credit risk environment. Prioritizing these elements enables financial organizations to improve risk management efficiency, proactively identify and manage credit risk exposures, and protect the institution's financial stability. Finally, it is critical to continually assess and enhance the credit risk environment. Regular reviews, internal audits, and external validations assist identify problem areas, close gaps, and guarantee regulatory compliance. The framework for credit risk management is strengthened by ongoing development and learning from previous mistakes, increasing its adaptability to changing market circumstances.

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A Brief Discussion on Credit Risk Limits

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ABSTRACT: Credit risk limits are a fundamental tool in credit risk management, serving as a means to control and mitigate potential credit losses. This abstract provides an overview of credit risk limits, highlighting their significance, key considerations, and their role in effective credit risk management. Credit risk limits are predetermined thresholds that define the maximum level of credit exposure a financial institution is willing to assume. These limits are established to ensure that credit risk is managed within acceptable levels and aligned with the institution's risk appetite and overall risk management strategy. They serve as a crucial mechanism for controlling and monitoring credit risk exposures across different portfolios, counterparties, and credit products.

KEYWORDS: Credit Risk Tolerance, Daily Loss Limits, Exposure at Default (EAD), Industry Limits, Internal Credit Limits, Liquidity Limits.

INTRODUCTION

Credit risk limitations outline the maximum amount of credit risk that may be taken on in credit, investing, and other financial transactions. To control the magnitude of the exposures and prevent excessive credit concentration, the limitations are primarily created as maximum exposure limits and country exposure limits. A single borrower and a collection of businesses that are under the same borrower's management are all covered by the exposure limitations. To control the whole credit business, the bank needs set up several sorts of credit risk restrictions.

The first category of credit risk limits relates to limits that are specific to each economic sector, which outline the maximum exposures that can be made to industries like manufacturing, trade, agriculture, export-import, real estate, and capital markets. The level of sector-specific constraints is determined by government policies, the forecast for the economy, company prospects, and regulatory recommendations. Additionally, default rates and risk-adjusted company returns in various industries have an impact on the design of sector-specific limitations. The restrictions are changeable, change from year to year, and, if necessary, are even changed within the same year. A minimum proportion of the total loans and advances that banks are required to provide to certain industries that are designated as priority industries or to specific groups of persons who are deemed to be economically weak is sometimes prescribed by central banks or bank regulators. While lending to priority industries or the

disadvantaged entails more risk, these restrictions are the minimum standards that banks must meet [1]–[3]. The second sort of credit risk limitations refers to industry-specific restrictions, which are typically maintained between 10% and 15% of overall credit exposure, although the limits might be greater if the variety of sectors in a nation is particularly restricted. For instance, industry-specific restrictions may be much higher if oil exploration and refining are the primary industrial establishment. Higher limitations may be set since the needed amount of loans is often significant for key industry groupings including electricity, telecommunications, road building, airports, seaports, oil exploration, and refining, which make up the infrastructure sector of the economy. As a result, credit risk limitations for financing infrastructure-related sectors are often greater than those established for manufacturing-related industries. However, due of the increased risk associated with the loans' often extremely lengthy term, banks will need to exercise caution when setting limitations for the infrastructure sector. To prevent liquidity issues brought on by a duration mismatch between assets and liabilities, the bank should consider the term structure of its obligations while selecting the form of industry-specific limitations. The remedy is loan syndication or involvement by other banks when the credit limits demanded by parties exceed the established restrictions.

The sensitive sector-specific limitations, which mostly apply to the real estate and capital market sectors, are the third category of credit risk limits. The bank should take asset value volatility into consideration when creating the structure of sensitive sector risk limits and

set the limitations based on current market circumstances and historical volatility rates. Limits for financing of market-sensitive operations or assets, or those where there are larger revenue generating risks, should be kept to a minimum. The sensitive sector cap should include sublimits for the venture capital, film and entertainment, commercial real estate, and capital markets sectors. In response to the indications from credit portfolio analysis, these constraints should be flexible and reset more regularly.

The fourth category of credit risk limitations, which includes single-borrower and group-borrower restrictions, is related to counterparty exposure limits. Typically, the maximum counterparty exposure and big exposure restrictions are set by central banks or bank regulatory bodies. The maximum exposure limits for single and group borrowers are often defined in terms of specified percentages of a bank's total capital reserves. The established risk limitations include the off-balance-sheet exposures to a single borrower and group-borrower. The regulatory authorities sometimes permit minor alterations to the single-borrower and group-borrower exposure restrictions within the specified limits of credit concentration. Due to the lack of a sufficient definition of "group-borrower," banks find it practically challenging to manage the group-borrower restriction. Due to the lack of transparency in the corporate connection, the criteria for designating a group-borrower, such as the minimum percentage of stock ownership, the creation of a consolidated balance sheet, or proof of control by the same management, are sometimes deceptive. By setting up fake entities, it is feasible for one management to exercise control over a number of entities. It is advisable to include all entities that are linked to one another through equity holdings, intercorporate investments, or entities that appear to have a common management structure with direct or indirect control in order to preserve the integrity of the group-borrower limit. In the long term, it is ideal for the bank to ignore the criterion of majority-holding or minority-holding of equity capital as long as it is clear that a certain set of businesses belongs to a group-borrower. This will help the bank avoid credit concentration in group-borrowers.

The country-specific risk limitations are the sixth category of credit risk restrictions. For the purposes of calculating regulatory capital, the New Basel Capital Accord does not regard all sovereigns as risk-free counterparties. The New Accord established risk weights for the computation of regulatory capital on exposures to sovereigns, except those with AAA to

AA- ratings, ranging from 20 percent to 150 percent. Because it acknowledges the different levels of risk associated with exposures to the sovereign counterparty depending on the rating, this obligation to evaluate sovereign risk is notable. Between nation risk and sovereign risk, there are some differences. The first indicates the risk associated with exposures to the government and government-owned businesses, while the second, the risk associated with exposures to all counterparties inside the nation, presumably including private parties, is represented by the former. But from a practical standpoint, total exposure to all counterparties inside a nation, regardless of their status, should be taken into consideration for setting country-specific restrictions. Such difference is more theoretical than practical.

Setting national risk boundaries will need a two-way effort from the banks. In order to set maximum nation exposure limits, it is first required to categorize the countries into different risk categories. Next, these categories may be expressed as absolute sums or as a percentage of the total capital funds. The nation exposure limitations will change since different countries perceive risk differently, as seen by their country ratings. As they won't have access to essential data and information about other nations, banks may find it challenging to grade countries using internal models. They must to use the ratings provided by reputable international credit rating firms and classify the nations into different risk tiers in line with their ratings. The external ratings may be used as a baseline, and banks should supplement them with information gathered from both internal and external sources to adjust nation risk as necessary and reset country risk ceilings as often as necessary.

The credit limit structure should also include restrictions on exposures that are not shown on the balance sheet. Banks should be aware of the risks associated with excessive off-balance-sheet exposure, maintain a balance between on- and off-balance-sheet exposures, and set a fair cap on the overall amount of off-balance-sheet exposure relative to the total amount of on-balance-sheet exposure. The frequency and severity of prior liabilities that have devolved from these exposures affect how much of an off-balance-sheet exposure limit is fixed.

DISCUSSION

Large Exposure Limit

The term "large exposure" is a relative one in credit administration, and different banks and bank

regulatory bodies have different definitions of it. However, conservative banks describe an exposure as big when the quantity of exposure reaches a certain threshold, regardless of the size of the capital funds. big exposure is often defined in reference to the capital funds. As a result, some banks define a significant exposure as one that exceeds, say, \$10 million in the United States, while other banks define a large exposure as one that exceeds, say, \$50 million. The quantity is directly correlated with the bank's ability to assume risk as well as the exposure size distribution of loans and advances. Conservative banks may categorize an exposure as "very large or significantly large" if the amount exceeds the stipulated percentage of capital funds and may describe an exposure as "large" if the overall exposure to any counterparty is between 8% and 10% of the total capital funds. The authorities often impose a restriction on the total of significant exposures in terms of a multiple of capital funds in order to manage credit risk. A reasonable definition of a big exposure and a cap on the overall number of large exposures should be included in the credit risk limit framework.

If the absolute amount is too high, adopting a rigorous definition of big exposure based on a specific proportion of capital funds without considering other factors may sometimes put the bank in severe difficulties. For the sake of managing credit risk, a flexible definition of big exposure based on different risk perceptions is more important. It is possible to identify counterparty composition as a factor in determining the amount of the significant exposure. Large exposures may be defined as moderate exposures to private persons, proprietary businesses, or partnership concerns, however for limited liability organizations, the exposure size must be substantial to qualify. Similar to that, another factor for determining substantial exposure is the risk rating given to a borrower. One example of a huge exposure is a medium-sized exposure to a high-risk borrower. When operating within lower restrictions, a risk-sensitive bank should see the single-borrower, group-borrower, and big exposure limits created in response to regulatory requirements as the outer limits.

Two fundamental components of effective credit risk management are served by the detection of significant exposure. The number and total amount of large exposures in the total credit portfolio serve as indicators of the severity of credit risk the bank faces. First, large exposures are subject to strict and intensive follow-up by the bank's credit risk monitoring officials, which lowers the likelihood of default. A few

extremely big exposures in a credit portfolio carry much greater risk than the sum of the risks from a large number of exposures that are relatively modest in size. The prevalence of big exposures in bank credit portfolios is a real problem for bank regulatory agencies. The bank regulator or supervisor cannot accept the situation if a bank's credit portfolio is structured so that a sizable portion of all credit exposure is restricted to a small number of large parties, especially if the bank is systemically important to the local financial system [4]–[6].

Indicators of Early Warning Signals

Early warning signs are unfavorable developments in borrowers' businesses and accounts that might eventually result in a loan default. The warning signs are not always obvious, thus a diagnostic process must be used to identify the borrowers' financial condition's vulnerabilities. An essential component of the credit risk management system is the identification of early warning signs that may be used to start corrective action before loan accounts become problematic. There are many different methods and processes for identifying early warning signs, but banks typically base their systems on the composition of their credit portfolios, as well as how they distribute credit based on clientele and exposure size. There are at least two different early warning signs that are significant. One set corresponds to the signals that come from a standalone counterparty exposure study, and the other set to the negative characteristics that come from a standalone portfolio analysis.

The examination of activities in the ledger accounts of the borrowers, the balance sheet and other financial metrics, the business trend, including potential dangers to the company, and these indicators are used to generate warning signals. Analyzing the history of the accounts with a focus on the unsatisfactory qualities will help you find any flaws in the borrowers' loan accounts. Unsatisfactory features include failing to adhere to the terms of a credit sanction, not fulfilling documentation requirements, issuing checks to third parties without sufficient funds in the account, failing to pay discounted trade bills on time, and failing to settle liabilities that have accrued on the bank as a result of off-balance-sheet exposures. Near default situations are indicated by poor performance in the borrowers' overdraft or short-term renewable accounts, which exhibit sticky tendencies. The early detection of these damaged loan accounts provides opportunity for the business units of the borrowers to be restored and revived. However, as defaulting

borrowers have a propensity to conceal their accounts via false entries, relying only on the examination of ledger accounts as a method for early warning signal identification is unlikely to provide positive results in many instances. Other financial and nonfinancial considerations need to be taken into account.

In order to identify warning signs from credit portfolios or subportfolios that are deteriorating, the bank should examine credit quality from four perspectives:

1. Analysis of the portfolio's borrowers' rating migration.
2. Examining accounts that go bad too fast after money has been distributed.
3. Analyzing the frequency of defaults.
4. Evaluation of changes in the expected credit losses throughout the preceding intervals.

Some of the warning signs that call for a more thorough investigation at the microlevel for changing loan entrance requirements and loan departure policies include noticeably downgraded ratings of borrowers, a rise in the number of loan defaults, and a quick decline in the market value of collateral. There are a few credit risk models that can forecast corporate bankruptcy, insolvency risk, or company failure. The models list the counterparties who are most likely to file for bankruptcy shortly or break their debt service commitments. The effort to identify warning signals has only just begun with the creation of the list of borrowing enterprises that are most likely to default. The hard work is in doing a microanalysis of the borrowers' business affairs, spotting the problems indicated by poor financial ratios and other nonfinancial elements, and taking corrective action to stop the borrowers' accounts from slipping into default.

Financial and nonfinancial parameters should be used by the bank to identify early warning signs. It must uphold a minimal set of criteria that should be used as the standard for comparison. Credit risk and economic factors are strongly correlated, but so are credit risk and market risk-related elements as well, since the volatility of market variables raises credit risk by causing a fall in asset prices. When compiling the list of financial criteria for comparison, the bank should be aware of these connections. Saying that solely financial variables affect the credit quality of counterparties is an understatement since banks have plenty of documentation demonstrating instances where defaults in borrowers' accounts happened as a result of nonfinancial reasons even when financial ratios were deemed to be sound.

Credit Auditing Methodology

In a suitable amount of time after the sanction date, a credit audit focuses largely on the retrospective assessment of new loan sanctions. A credit audit's primary goal is to conduct an unbiased evaluation of the caliber of new credit assets in light of the safeguards established by the bank. The review team examines the accuracy of the risk grade given to the borrowing entity, the thoroughness of the due diligence process, the observance of entry point standards for sanction granting and documentation formalities completed prior to the disbursement of funds, and whether branch offices are adhering to postdisbursement supervision procedures in order to safeguard the bank's interests. The evaluation is conducted with the goal of identifying early warning signs and offering suggestions for remedial action.

The evaluation must be completed within three to six months, and the sooner it is completed, the more important the accomplishment of the credit audit function will be. Due to variations in the size and makeup of the loan portfolio, a credit audit's scope and purposes vary across institutions. Since the amount of total credit varies from bank to bank, the credit audit often includes new credit sanctions exceeding cut-off thresholds. However, the credit audit function may be selectively expanded to include current accounts, particularly those revolving credits with sizable balances that are renewed at certain periods. A credit audit should concentrate on big new loans, but it may also encompass medium and large existing exposures picked at random from the bank's records that are still active. The goal is to cover at least 20 to 25 percent of all medium and large exposures each year via a rapid audit.

Enterprise Status

At least four fundamental criteria should be fulfilled by the credit audit mechanism:

1. Soon following sanctions, it should be possible to do intentional monitoring of new big and medium-sized credits.
2. To prevent duplication of the audit function, it should have distinct audit foci.
3. It should guarantee that the credit audit team has no involvement in the processing or approval of the loans chosen for audit.
4. It should make sure that the credit audit team is made up of people with experience in credit administration and processing.

The organization's credit audit system should be in good standing given the crucial function it plays. Banks have departments for credit, risk management,

inspections, internal audits, and sometimes a separate department for credit monitoring. The credit department, often known as the credit monitoring department, is responsible for keeping track of accounts. Because a distinct setup for the credit audit function is often seen as unnecessary, the function is given less priority, both in terms of staffing levels and employee capabilities. However, the credit audit is important for limiting credit risk with significant exposures. Establishing a separate credit audit cell or department and connecting it to the risk management department or the credit monitoring department will satisfy the criteria. Credit audit setup shouldn't be included in the credit department since it might lead to conflicts of interest, and it also shouldn't be included in the inspection or audit departments because it will lose its identity and concentration. This will have an impact on the special review's quality and goal. Documenting audit findings, processing audit reports, and keeping track of remedial measures made by the appropriate departments are all tasks that the credit audit department will do. One of the duties of the credit audit department is to routinely report on the credit audit function to the board of directors and senior management.

The internal audit division of banks conducts management audits of controlling offices and the head office on a quarterly basis, in addition to routine audits of branch offices. Banks often audit branch offices using a discriminatory cycle. All loans and advances are examined by the internal audit team during the audit as part of their regular duties. The credit audit has a distinct scope and objective than a typical internal audit. The former conducts a brief examination of new credit sanctions, focusing on big and medium exposures, from the perspectives of processing quality, decision soundness, and appropriateness of penalty conditions. This prevents the credit audit's duties from duplicating those of the standard internal audit. For a limited audit of big exposures that were approved in the past but are still active, the credit audit unit may alternatively work as a distinct setup in parallel to the ordinary audit department. This audit can be done on a sample or selective basis. If previous revolving credits are included in the scope of the credit audit, there will be some overlap between the duties of the credit audit and ordinary audit, but this is admissible as a component of the checks and balances system. While the credit audit team may quickly assess the caliber of revolving and renewable credits, the internal audit team often concentrates its attention on the shortcomings in credit

administration and anomalies that occurred between two audit cycles. This little overlap of responsibilities might make the checks and balances system seem more legitimate [7]–[9].

Techniques for Mitigating Credit Risk

The whole credit risk management process includes credit risk reduction strategies. Along with reducing the likelihood of default on credit exposures as much as is practical, the primary goal of credit risk mitigation is to avoid or significantly minimize the amount of actual loss in the case of failure. Credit risks may be reduced in a number of ways, but three are the most popular. These approaches are:

1. Conventional approach.
2. Credit-enhancing technique.
3. Method using credit derivatives.

Conventional Approach

The typical approach to credit risk reduction is tightening credit administration via aggressive internal rule and procedure adoption. Credit sanction, distribution, monitoring, and recovery are all parts of the credit administration process. For each of these credit management tasks, banks have defined rules and processes that must be meticulously followed in order to maintain good credit exposures. Credit defaults will rise and higher credit losses will ensue when the risk materializes if any of these tasks is not rigorously completed. The shortcomings in the credit administration system and the reasons for greater default rates will be revealed by analyzing nonperforming loan accounts and looking at issue exposures. The findings of the study will determine the kind of corrective action needed for risk minimization. To prevent money from being misused, it may be necessary to tighten the loan disbursement process, strengthen the loan appraisal procedure, raise the standards for loan eligibility, closely track the borrower's finances, closely watch how its loan accounts are being used, and speed up the recovery process in case of default. These established techniques for reducing credit risk are often undervalued. The internal audit process gives the bank management some solace, and they are certain that by putting the suggestions from the internal audit into practice, the flaws in the credit administration system would be fixed. However, the internal audit system typically falls short in this area because it places more emphasis on the discovery of anomalies than on the flaws in the systems and processes that need constant evaluation and modification. Banks often search for other methods to reduce credit risk rather than

attempting to identify the holes in the credit administration process by hiring experts to bolster the systems and processes. To prevent having to use more challenging methods that could be more costly in the long term, strengthening the credit administration procedure is like fixing the system's weaknesses as soon as possible [10]–[12].

CONCLUSION

In conclusion, Credit risk limits help financial organizations monitor and reduce possible credit losses. They are a crucial part of credit risk management. Credit risk exposures may be kept within acceptable bounds by setting clear limitations that are consistent with the institution's risk appetite. Risk appetite, portfolio characteristics, risk measurements, risk tolerance, and risk capacity must all be carefully taken into account when setting effective credit risk limitations. To keep credit risk limitations effective and guarantee they stay applicable in the changing credit climate, regular monitoring, reporting, and periodic reviews are crucial. Credit risk restrictions should be regularly reviewed and reevaluated since they are not static. They must be flexible and adaptable to changes in the institution's risk profile, regulatory regulations, and market circumstances. Credit risk limitations are periodically reviewed to ensure they are still applicable, practical, and representative of the changing credit environment.

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A Brief Study on Credit Enhancement Method

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ABSTRACT: Credit enhancement methods are crucial tools used in financial transactions to mitigate credit risk and improve the creditworthiness of borrowers or issuers. This abstract provides an overview of credit enhancement methods, highlighting their significance, key strategies, and their role in facilitating access to credit and reducing the cost of borrowing. Credit enhancement methods aim to increase the likelihood of timely repayment and reduce the potential for default, thereby providing investors with added confidence and lowering the credit risk associated with a particular transaction or investment. These methods are particularly relevant in situations where borrowers or issuers have limited credit history, lower credit ratings, or face challenging market conditions.

KEYWORDS: Credit Risk Transfer, Debt Service Reserve, Excess Spread, Financial Guarantees, First-Loss Provisions, Overcollateralization.

INTRODUCTION

Credit enhancement minimizes the credit risk connected to a specific transaction or collection of transactions and may take many different shapes. There are a few possibilities for credit enhancement, but banks should choose the one that best fits the kind of reaction required given the current situation. The risk mitigation reaction may relate to a specific client, a specific exposure, or a group of comparable assets. The following techniques may be used to improve credit:

1. Collateralizing a loan.
2. Loan assurances.
3. Participation in a lending syndicate.
4. Loan protection.
5. Securitization of loans.

First off, by adding more collateral to a current credit exposure, credit risk may be reduced. When the market values of the collateral drop, the credit risk for banks rises, especially the credit risk from big and medium exposures that are already backed by collateral. As a result, the margin amount provided at the time of loan approval is reduced, and banks work to control the rising risk by raising the margin on loans and revaluing the collateral. When market circumstances are unstable and collateral values change dramatically, banks may reduce risk from the current exposures by acquiring additional collateral that belongs to the borrower, such as a mortgage on real estate or an assignment of marketable financial instruments [1]–[3].

Second, if there is concern that the credit quality is expected to decline, credit risk on exposures may be reduced by securing financial assurances from other

parties. A company, a bank, or a private entity may carry out the financial guarantee. To cover credit facilities granted to a corporation, the bank may require its directors to provide personal financial guarantees. It may also request the parent company to provide a guarantee, the partners of a partnership firm to provide a guarantee, or even the personal guarantees of individual borrowers. Third, banks may significantly reduce credit risk by using loan syndication or loan participation. To provide loan facilities to a single customer or borrower-group, a number of banks and financial institutions may band together.

Credit risk may be reduced by loan participation in situations when the exposures are significant and long-lasting, such as a loan for a significant infrastructure project. The sponsor institution or the lead bank may, in the event of new loans, request other banks or credit institutions to participate on a mutually agreeable basis. The collaborating institutions share the risks associated with such significant exposures. Other credit institutions may be persuaded to absorb a part of the big exposures that are already on the bank's books. In the event of extremely large-value exposure, where the quantum of loss, if the default materializes, might be quite considerable in comparison to the yearly revenue or capital of a bank, the loan syndication or loan participation technique is especially essential. If the sum is too high and exceeds the counterparty limit or significant exposure limit imposed by the bank regulator, loan sharing is required.

Fourth, credit risk may be reduced by acquiring loan insurance from insurance providers. This insurance will reimburse the bank in the event that the borrower defaults. Since many nations lack insurance firms to

offer insurance coverage for bank loans, this kind of risk reduction is uncommon. A credit insurance corporation or credit guarantee corporation has been established in the public sector in some countries where banks are reluctant to make loans to certain sectors due to high risk, such as the agricultural sector and the small and tiny industries sector, to provide insurance for small loans, though for limited amounts. However, having access to a public sector company that offers credit insurance, even to a limited amount, is another method of credit risk reduction.

Fifth, by securitizing a group of assets, credit risk may be reduced. Asset securitization is only useful if a bank has a large pool of homogeneous, comparable loans that can be grouped together to create an asset class. Credit card receivables, mortgages, real estate loans, and other types of loans, for instance, may be combined to create several asset classes for securitization. However, not all forms of securitization reduce risk. The asset securitization process should be designed to shift all or part of the credit risk associated with the underlying pool of exposures to a third party, which is often a special-purpose vehicle or an organization created particularly for securitization. The risk mitigation goal is accomplished when the originating bank's credit exposures are lawfully transferred to the special-purpose vehicle or the designated organization in return for money or securities without recourse in the future, which results in the transfer of credit risk. A straightforward method of reducing credit risk is to request a cash margin from the borrowers or the maintenance of deposit accounts. The borrower and the bank must have formal agreements in place before the bank may offset the former's obligations with deposits it has. Legal provisions often provide protection for banks when netting deposits against clients' unpaid debts.

DISCUSSION

Credit Derivatives Method

Utilizing derivative instruments to hedge the risk is the third strategy for reducing credit risk. A financial product known as a derivative gets value from an underlying asset but does not have an independent value of its own. To offer protection against the risk of price fluctuation, value eroding, or entire loss of value, derivatives may be created with regard to any underlying asset. To reduce the risk involved in various sorts of transactions, financial engineers might create various derivative products. Banks must use credit derivatives to shift the risk of credit exposure to

a third party in order to reduce their exposure to credit risk. Credit derivatives may be created synthetically to shift or even remove the risk associated with credit exposures, but their fundamental structure is limited to three main categories.

Credit default swaps are the first class of credit derivatives, and they are designed to guard lenders against the loss of value on their credit exposure as a result of any kind of credit event. A credit default swap is a derivative contract in which one party agrees to make a certain payment in exchange for receiving a premium or a stream of payments at regular intervals for the agreed-upon length of time in the event that a negative credit event such as a downgrade in rating or default on repayment occurs, or if the counterparty seeks bankruptcy protection or negotiates a restructuring of the debt. For instance, two banks enter into an agreement in which the risk of default is shared by both parties. The credit default swap expires with the payment made by the second bank to the first bank in the event that any credit event happens. The magnitude of the premium is computed in relation to the likelihood that a negative event will occur and the anticipated market value of the reference asset in the event that the negative credit event occurs. However, banks will need to evaluate the credit default swap sellers' financial standing, as well as their corporate governance and risk management procedures, since they may fail to fulfill their obligations under the contract, as occurred to systemically big financial institutions during the

Credit return swaps, which provide protection against revenue loss due to falling credit spreads, are the other sort of credit derivative. When the credit spreads on loans or corporate bonds are becoming smaller or when interest rates are generally falling, a credit return swap is advantageous. Let's say a bank wishes to protect its interest revenue from a credit risk from a prediction that lending interest rates would decline. The bank will then engage into a swap agreement with a different counterparty, agreeing to provide a set yield for the duration of the loan in exchange for paying the current market interest rate on a notional amount at intervals of every six months. The bank will safeguard its interest revenue if the lending rate decreases. A similar arrangement is a total return swap, whereby a bank trades periodic payments on an underlying asset—which typically include interest payments at a floating rate and asset appreciation, if any—to be made to another bank over the course of the agreement for a total return on the asset, which also includes interest payments at the benchmark rate plus credit

spread and any loss in the asset's value, if any—as well as periodic payments on the asset themselves. A credit default swap and a total return swap are different in that the former protects against a loss when a credit event occurs, whilst the latter protects against a loss of value regardless of the reason. Additionally, the interest rate risk is transmitted through a total return swap [4]–[6].

The third category of credit derivatives involves the development of credit-linked notes with a single asset or group of assets as the basis. In this kind of derivative instrument, the risk of credit exposure is transferred to the note holders who agree to accept a lower amount of the principal due in return for a greater yield, should a negative credit event occur prior to the maturity date. If there is a thriving market for credit derivatives and there are plenty of buyers and sellers of credit derivative goods, then credit derivatives may be extensively employed as risk reduction strategies. All credit derivatives for the given notional quantities and timeframes may not be available or, if they are, the conditions could be exorbitant when there are few participants. Aside from that, banks must exercise caution when choosing counterparties to purchase derivative products from in order to hedging credit risk since such parties could not uphold their end of the bargain obligations on time.

Instead of managing troubled loans or delinquent loans, credit risk management deals with the risk from credit exposures before default. The goal of credit risk management is to keep the bank's exposure to loan loss and defaults to a minimum. Credit risk and the frequency of credit defaults rise as a result of poor credit management. In contrast to market risk, credit risk also occurs in trading and banking books and has numerous causes. A credit risk management strategy should take into account issues caused by a variety of people managing credit and a variety of operational points where credits are provided.

The core of the credit risk management process is defined by the specification of credit granting procedures, standardization of credit sanction terms and conditions, independent review of credit exposures, prescription of entry-point criteria, establishment of maximum exposure limits and tenure-wise exposure norms, and appropriate delineation of credit administration responsibilities. Regardless of the rating grades given to them, borrowers' creditworthiness should be independently evaluated since a low-risk rating does not ensure that the credit will be repaid. Loan offers from connected

parties should go through the same due diligence process as loan proposals from unrelated parties.

Since anomalies occur during implementation, it is the most susceptible part of credit administration. Principles of "Know Your Customer" should always be followed while creating credit connections. To prevent conflicts of interest, the organizational structure for credit risk management should recognize the differences between the credit administration and credit risk management functions. However, as part of the integrated risk management process, it should also achieve coordination between the credit risk, market risk, and operational risk management functions.

The main tactics for credit risk management include articulating the credit risk vision and creating credit risk policies and lending policies. The field officials are directed by the credit risk vision and credit risk policy to develop a balanced loan book from a risk mitigation perspective. To control credit risks, banks should set sector-specific credit limitations as well as counterparty exposure limits, nation limits, off-balance-sheet exposure limits, and large-exposure limits. To detect early signs of illness emerging in the business units and accounts of borrowers, they should establish a reliable warning signal detecting technique. As soon as new credit assets are approved, banks should set up the credit audit function to conduct an impartial assessment of their quality. As new situations arise, banks should make the best decisions possible to reduce credit risk. To lower the likelihood of default, they should improve their credit administration processes. To decrease, transfer, or even completely remove credit risk, they could also use credit enhancement and credit derivatives.

Classification of Portfolios

Both investment and credit portfolios are addressed by portfolio management. The investment portfolio is divided into a number of subportfolios, including the portfolios for corporate bonds, sovereign securities, equity investments, mutual funds, and so on. The management of the investment portfolio is focused on safeguarding investment values against the erratic nature of market factors. Credit portfolio management involves periodically reviewing each portfolio to assess the quality of the assets housed within and to safeguard them from losing value by taking timely remedial action. Banks may split their entire credit assets into several portfolios or subportfolios in order to manage their credit portfolio.

Banks may choose the portfolio composition while considering the kind and distribution of their loans and

advances. They may categorize overall credit exposure into portfolios based on use, industry, borrower type, or even product. However, it is advantageous to group large credits into sector-specific portfolios, such as those for the infrastructure, manufacturing, trade, and real estate sectors, and relatively medium- and small-sized credits into retail portfolios, such as those for residential mortgage loans, auto loans, personal loans, student loans, and credit card portfolios. Due to the homogeneity of retail borrowers, who are mostly people, the modest number of loans, and the simplicity of the facility structure, which consists of one or two loan items, managing a retail portfolio is comparatively simpler.

Due to the complexity of the facility structure and the absence of consistency in the amount, purpose, and term of the loans given to them, managing the portfolio of corporate credit is more difficult. When managing corporate loan portfolios, the bank must acknowledge the variability of borrower characteristics and facility features since it is difficult to group corporate loans into practical lots for portfolio analysis based on the homogeneity of characteristics.

Objectives for Portfolio Management

The main goal of managing credit portfolios is to identify portfolio quality degradation early on and prevent an excessive concentration of exposures that might include significant concealed credit risk. The goal is to develop a broad-based credit portfolio by judiciously allocating loans to a wide range of clients. Through the use of credit portfolio analysis, banks may create balanced portfolios and reduce total credit risk by steering lending into more profitable and lower-risk business lines. The results of the portfolio analysis aid the bank in formulating its future loan expansion initiatives. The bank can identify credit subportfolios that are most likely to degrade in quality via routine portfolio analysis.

Issues with Portfolio Management

The portfolios should be examined by the bank from two perspectives. The bank should first examine the change in portfolio quality using a rating migration analysis before determining the change in portfolio health by looking at changes in possible losses over time. To create a successful portfolio management system, the bank may take the following measures:

1. What standards should be used to determine the composition of portfolios with a broad range of loans and advances in terms of clientele, purpose, and tenure?

2. If there are many borrowers and many small loans for many different reasons, how should the relevant data on counterparty rating, chance of default, loss rate given default, and exposure at default be generated?
3. What approach should be used in portfolio review to attain better impartiality given information on counterparty correlation and asset price volatility is often not readily available? These statistics are often also unreliable.
4. What standards should be used to quantify portfolio concentration?

The first concern refers to the selection of factors used to determine the makeup of the portfolio. The loans and advances made by commercial banks are dispersed across a vast number of customers, and their credit portfolio is made up mostly of term loans and revolving credits. Additionally, there are subportfolios for the steel, cement, chemicals, electricity, and petroleum sectors inside the larger manufacturing sector portfolio. The bank must decide whether to assess the portfolio for the manufacturing sector as a whole or as subportfolios. The first choice is preferable since various subsectors have many borrower and facility characteristics in common, and the assessment criteria that will be used may not significantly change between them. However, the agricultural and related agricultural sectors consist of enormous numbers of loans for various purposes, while the personal loan sector includes loans for residential housing, the purchase of cars and other consumer durables, the acquisition of equity share, higher education, and other purposes.

Due to the absence of uniformity in borrower and facility characteristics, it is inappropriate to combine a few subportfolios into larger portfolios in such circumstances. It is preferable to create subportfolios, such as those for home loans, auto loans, consumer durables loans, agricultural loans, and small industries loans, and analyze each one independently. However, there are some limitations when using portfolio analysis techniques on these subportfolios because it won't be possible to study the rating migration or calculate risk-adjusted returns on subportfolios without the risk-grade-specific data on probability of default, loss rate given default, and exposure at default. Due to the large number of borrowers and small loans involved in the process, it is challenging for the bank to gather this data on an individual borrower basis. The bank may generate average data on ratings and risk factors for each subportfolio using random sampling [7]–[9].

In the end, the bank may divide loan portfolios into two groups: wide portfolios like those for the infrastructure, manufacturing, commerce, and export sectors, and relatively smaller portfolios in the retail sector. With regard to broad credit portfolios, the bank should gather rating information specific to borrowers as well as risk-grade-specific information on the likelihood of default, the loss rate in the event of default, and exposure at default. Additionally, the bank should research risk migration and changes in the potential loss amount associated with the portfolios over time to determine how the quality of the portfolio has changed. In order to evaluate the overall quality of the subportfolio and variations in quality over time, the bank may aggregate the risk ratings of a sizable number of individual borrowers in each group as part of the evaluation of the retail sector portfolios. Based on risk rating and risk component data for samples of borrowers that make up the portfolio, the bank may create the risk-grade-wise distribution of retail sector subportfolios and estimate the probable losses using average values. For the purpose of evaluating a specific subportfolio reflecting a homogenous borrower-group, such as borrowers in the residential housing sector, the average of the risk component data should be used.

The second concern is the choice of methodology for calculating counterparty correlation and asset price volatility. When two counterparties are correlated, it means that when one counterparty is impacted negatively by the actions of the other, so is the other. One day they could both simultaneously stop making payments to the bank. Assume there are two sizable firms supported by two distinct industrial groupings, one in the steel industry and the other in the automotive and associated industries. Let's say that a sharp rise in oil costs leads to a sharp decline in the demand for vehicle items. Due to the simultaneous decrease in demand for steel goods, both counterparties are more likely to default on their loan agreements as a result. As a result, both of these sectors' output and revenue creation will decrease. Despite the fact that the two industries are held by independent and unconnected industrial groupings, the link between them has negatively impacted both the two firms at the same time. The end consequence is a concomitant decline in the credit portfolio quality for the steel and automotive industries as a result of the rise in oil prices. Despite the loan portfolio's diversification to reduce concentration, the linkage between the two manufacturing divisions impacts both portfolio quality and performance level at once. High

borrower correlation accelerates the degradation of portfolio quality.

Typically, there is a lack of reliable information on portfolio and counterparty correlation. Banks may utilize such data for portfolio assessment if there are specialist institutions or governmental organizations that provide data on the connection between industrial sectors and portfolios. Credit connection cannot be estimated using a straightforward process. In the developed financial markets, efforts have been made to assess the correlation between defaults and bond market spreads. The findings have been used to determine the counterparty correlation within a specific portfolio. Since trustworthy information on bond ratings and corporate bond market spreads is only sometimes accessible, this strategy may not be practical in the majority of situations. However, by analyzing the influence that negative changes in macroeconomic circumstances have on the counterparties, the bank may internally estimate credit correlation data. To quantify the connection between counterparties and portfolios, it is possible to do stress tests on the ability of individual borrowers from various portfolios to service their loan under various macroeconomic scenarios.

The third concern relates to the standardized assessment of portfolio concentration standards. Over time, certain banks have built up specialized knowledge and created unique products to provide loans in particular industry sectors. They intend to take use of this knowledge to develop a specific market for their goods and amass a large portfolio in that industry. From the perspective of credit concentration, even a big portfolio cannot be deemed risky if the projected default frequency of the portfolio is low and the risk-adjusted return is high. However, a portfolio this size is vulnerable to risks that might result from shifting economic conditions, such as a recession in the economy or negative changes in governmental economic policy. Lower thresholds for determining loan concentration may be established by conservative institutions with modest risk appetite. They may designate a portfolio as having high concentration if the overall exposures in that portfolio surpass 15% of the total credit. Banks that have a high-risk tolerance and are skilled at offering unique sorts of loans at favorable conditions may impose a higher ratio for defining credit concentration. After evaluating the potential and the dangers, banks should establish an accept definition of loan concentration while taking into consideration their strengths and limitations. A portfolio's overall exposure ceiling should not be too

low since operating at the optimal level might result in lost clients, revenue, and profits. In addition, there is a substantial risk involved with leveraging knowledge too much in order to increase focus in the selected business area [10]–[12].

CONCLUSION

In conclusion, Credit risk mitigation and credit access are greatly aided by credit improvement techniques. Securitization, collateralization, guarantees, and derivatives are popular techniques used to increase creditworthiness and lower the credit risk posed by issuers or borrowers. These techniques boost the trust of investors or lenders by offering more security, which lowers borrowing rates and increases the availability of credit. To strike the correct balance between risk reduction and cost effectiveness, the choice of credit enhancement technique must be carefully evaluated and take into account a number of different criteria.

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A Study on Portfolio Analysis Technique

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ABSTRACT: *Portfolio analysis techniques are essential tools for investors and financial professionals to assess the performance, risk, and composition of investment portfolios. This abstract provides an overview of portfolio analysis techniques, highlighting their significance, key methodologies, and their role in optimizing investment decision-making. Portfolio analysis techniques aim to evaluate the performance and risk characteristics of a collection of investments, commonly known as a portfolio. By analyzing the individual assets within the portfolio and their interactions, these techniques enable investors to gain insights into portfolio diversification, asset allocation, risk exposure, and potential returns.*

KEYWORDS: *Beta, Correlation Analysis, Diversification, Mean-Variance Analysis, Modern Portfolio Theory (MPT), Portfolio Optimization.*

INTRODUCTION

Mapping Rating Migration

Assessing the effect of the borrowers' rating migration on the portfolio is the first phase in the portfolio analysis process. Using its internal risk rating model, the bank may choose a specific portfolio and calculate the percentages of exposures in each risk grade to the total credit outstanding in the portfolio for three or four subsequent quarters or half-years. To assess how much the credit quality of that portfolio has declined, the percentages of credit exposures in each risk grade across the review period are tallied and compared. The comparison will show the change in portfolio quality in terms of the migration of borrower ratings and the change in risk exposure. If there has been an improvement or decline in portfolio quality over the review period, it will be determined by the change in risk-grade exposure. If the proportion of exposures declines, especially in low-risk grades, the bank must identify the accounts of borrowers that have shifted to higher risk categories and carefully consider the causes of migration. Depending on the portfolio size and the shift in exposure quality identified by prior assessments, it will be decided whether portfolio reviews should be conducted quarterly or semi-annually [1]–[3].

Default Frequency Mapping

Making a frequency evaluation of loan defaults by borrowers in a portfolio is the second stage in portfolio analysis. The bank should generate data on borrower defaults by risk grade for each portfolio for the selected time period, map the data, and evaluate the results. If a portfolio's default rates are significantly

higher than average compared to other portfolios or the default rates for all loans in the bank, and if no temporary or unrelated factors can be found to explain the rise in default rates, the bank should take steps to gradually restructure the portfolio. The bank should simultaneously tighten the requirements for approval of new loans in the relevant portfolio, including raising the minimum down payment and collateral requirements.

Analysis of Loss Severity

Making a severity evaluation of the predicted potential losses of the portfolios throughout the review period is the third phase in the portfolio analysis process. Using the credit risk measurement model, the bank can calculate the expected loss amounts based on the total exposure held in each portfolio. It can then analyze the variations in estimated potential losses linked to each portfolio over the selected review period to determine which portfolio has the highest potential loss severity. If the bank uses an internal model to estimate the potential loss on its credit exposures, the New Basel Capital Accord recommends that the probability of default and the loss rate given default parameters used for loss estimation be, at the very least, averages of five- to seven-year default-related data applicable to the portfolio. The amount of possible losses in the relevant portfolios has grown as a result of the shift in credit exposures to deteriorating risk categories, where the chance of default and loss rate given default are substantially larger, and the portfolio needs more capital support.

DISCUSSION

Evaluating Correlation Effect

The evaluation of the effect on a portfolio due to borrower or portfolio correlation is the fourth phase in the portfolio analysis process. The value of an industrial subportfolio will be impacted by its connection with other industrial subportfolios if the bank has exposure to multiple kinds of businesses. In order to identify the subportfolios that are losing quality and determine whether they are correlated with other subportfolios, the bank will apply the risk-grade-wise borrower rating and risk component data to the exposures in all subportfolios. It will also study the rating migration and variation in potential losses over a period of three to four quarters or half-years. Due to the appearance of negative developments in another subsector that has connection with the prior industry, the loans and advances in an industrial subsector where the credit exposures are standard and performing will also decrease in value. For instance, if the construction industry slows down due to declining real estate values and the quality of exposures in the sector is declining, the bank must evaluate the values of exposures in the iron and steel, cement, paints, and other industries because there is a correlation between these sectors, determine the severity of the impact, and start a package of corrective measures to prevent further deterioration in the qu.

Impact of Exchange Risk Calculation

Making an impact assessment of foreign exchange risk on the foreign currency portfolio is the fifth step in portfolio analysis because the depreciation in foreign exchange rates affects the ability of borrowers who have taken out foreign currency loans or have other types of exposure to foreign currencies to repay their debts. Foreign currency loans must be repaid at the current exchange rate on the due date, either in foreign currency or the domestic currency equivalent of the amount owed in foreign currency. Exchange rate risk has greatly grown as a result of the large rise in cross-border transaction volume and the increasing volatility of financial market factors in many nations. The repayment obligations of borrowers with foreign currency exposures who do not have earnings in foreign currencies or who have not taken out insurance against exchange risk increase significantly in terms of domestic currency if the domestic currency depreciates, and many of them are likely to commit defaults. Therefore, the bank should assess the impact of various exchange rate scenarios on the foreign currency loan portfolio. The bank may separately

group the borrowers who have taken out loans in foreign currencies into a subportfolio and assess the impact from the angle of borrower rating migration and the ensuing change in the portfolio's risk-grade composition, as well as estimate the rise in potential loan losses [4]–[6].

Carrying Out Stress Tests

Three things must be completed in order to manage credit portfolios: do fast portfolio evaluations; run stress tests and scenario analyses on each portfolio; and determine how volatile asset prices are under various sets of assumptions. The bank should undertake stress tests on various portfolios using various sets of assumptions, including a general downturn in the economy, negative changes to fiscal and monetary policy, adverse movements in interest rates and foreign currency rates. In order to reduce the effect of realistic unfavorable scenarios, the bank should analyze the possible degradation in asset values under various stress circumstances and reorganize the portfolios.

Increasing The Management Information System's Capacity

Portfolio assessments need borrower-by-borrower rating data, risk-grade-by-possible-loss data, and other supplemental data to assess the credit portfolio's present quality and potential future scenarios. To perform efficient portfolio reviews, the bank should determine the information gaps it needs and keep improving its management information system.

Techniques for Mitigating Risk in Portfolios

Selecting Options for Risk Mitigation

Techniques for reducing credit risk generally are not fundamentally different from those used for portfolio risk. The bank evaluates the risk mitigation alternatives available and selects the optimal one to address the precise issues revealed by the portfolio analysis. Regulations that require banks to set reasonable counterparty limitations, sector-based restrictions, sensitive sector limits, and credit concentration limits, in addition to mandating the diversification of credit portfolios, to some degree prevent the growth of huge, fragile portfolios.

An asset securitization program, portfolio-specific actions, and borrower-specific actions may all help to reduce portfolio risk. First, if an analysis of a particular portfolio shows that it is likely to weaken over time due to the emergence of specific economic factors or external factors over which the bank has no control,

the bank may tighten the entry standards for new loans in order to deter potential borrowers and loosen the loan exit standards in order to encourage borrowers to pay off their debts sooner or transfer risk to other institutions through the sale of assets. Second, the bank may target the mitigation action at specific borrowers in the portfolio whose quality is declining, either by requesting more collateral from them, by stepping up monitoring and follow-up on loans, by inviting other financial institutions to cosign loans, by obtaining guarantees and insurance on loans, or by asking them to share loans with them. Third, in order to reduce the volume and value of the portfolio, the bank may securitize assets for a selection of loan categories, including auto, home, and consumer durable loans. To effectively shift risks to the special-purpose entities, asset securitization should be carried out with the necessary legal protection.

Improved Collateral Management Techniques

Collateral Management Policy Development

Because collateral is useless if its value cannot be realized within a certain time period, collateral management is crucial for reducing credit risk. Banks often take collateral without considering the difficulties in enforcing the collateral. The process for disposing of collateral is so drawn out and difficult that finally the collateral's risk mitigation function is gone. The court's ban on distressed sales of collateral slows down disposal because it makes it more difficult to find buyers willing to pay a fair price. Another restriction is the loan officers' reluctance to enforce the collateral because internal policies on collateral disposal are opaque. Loan officers often put off enforcement under various justifications, sometimes working in concert with the borrower. The New Basel Capital Accord permits a variety of credit risk mitigation strategies for capital relief, including transaction collateralization, netting of deposits against loans, protection of unconditional guarantees, and credit derivatives. Therefore, the bank must develop procedures for managing collateral and reducing credit risk.

The bank must create regulations for the acceptance and administration of collateral in order to ask the borrowers for help as a risk reduction method. The policy paper should go into detail about the many facets of managing collateral and provide operational personnel practical advice on how to handle collateral. The bank's stated policy about the need for and acceptance of collateral injects openness into the terms and circumstances of loan sanctions. The criteria

covered in the following paragraphs must at the very least be included in the collateral management policy.

Collateralized Transactions Definition

A loan transaction that is fully or partially hedged by collateral supplied by the counterparty or a third party on the counterparty's behalf is often referred to as a collateralized transaction. If the borrower defaults, the policy should clearly state what constitutes a collateralized transaction, describe the bank's specific lien on the collateral, and explain its legal authority to enforce the collateral and use its value to pay back outstanding obligations under both on- and off-balance-sheet facilities.

Specifying Acceptability Norms for Collateral

The policy should outline the different forms of collateral and the charges the bank will impose on each type of collateral. The collateral, which may be primary, secondary, or additional, serves as a security or safeguard against the borrower's unpaid obligations. Primary collateral is the asset that the bank creates as a result of the credit facilities it extends; the borrower is required to offer this asset to the bank as security through pledge, hypothecation, or mortgage. Typically, this asset takes the form of a mortgage on a home or factory land and buildings, a pledge of goods and merchandise, a hypothecation of machinery, consumer durables, and vehicles, among other things. The secondary or supplementary collateral is typically taken by banks in addition to the primary collateral when the dues are high or the risk is high, or as a safeguard against loans if there is no primary collateral. It typically takes the form of savings instruments, stocks and bonds, life insurance policies, personal guarantees, and so forth.

Even though the practice of requiring collateral before granting credit is commonly practiced, many banks do not have specific procedures for managing assets. As a result, the acceptance of collateral often turns into a formality to meet lending rules and is not seen as a useful tool for reducing credit risk. Banks should create a collateral management policy that outlines the types of collateral that are acceptable and those that are not. In general, physical collateral that can be quickly disposed of is given precedence over other forms of collateral, while collateral with a highly variable value or that belongs to other parties is given the least priority.

Collateral Management Procedure Establishment

The bank should specify how to evaluate both financial and non-financial collateral as well as its

insurance and collateral inspection policies. It should specify the amount of margin that borrowers must always keep and make sure that, in the case of a shortage, they restore the required margin. In order to account for any future changes in exposure quantity and collateral value, banks are obliged under the New Basel Capital Accord to increase the value of exposure to the counterparty as well as lower the value of collateral via haircuts. The percentage and application mechanism for haircuts should be stated in the collateral management agreement.

Because the bank's power to enforce collateral is often contested in court owing to flawed or insufficient paperwork, the bank should explain the papers needed to support its charge on the collateral. Contractual agreements in the required format, security delivery letters, title deeds and mortgage deeds, declarations from the parent and guardian in cases where a minor holds interest in the collateral, letters confirming the legitimacy of financial instruments offered as collateral from the company or a competent authority, letters from insurance companies assigning life insurance policies, and similar documents are examples of do. In line with the legal requirements regulating the specific kind of collateral in issue, the proper paperwork must be completed [7]–[9].

The bank should establish suitable protocols for the safekeeping of collateral and routine evaluation of its condition. It should include a method for remembering the financial collateral maturity dates so that their values may be realized on the due dates. Since different kinds of regulations control the enforcement of various forms of collateral, collateral enforcement is often problematic. Therefore, the bank should establish the enforcement mechanism to prevent claims from customers that the collateral was sold under duress, that coercive measures were used, or that questionable tactics were used to recover the value of the collateral. These claims might damage the bank's reputation or cause it to end up in court.

The main goals of credit portfolio reviews are to identify portfolio quality deterioration early on, avoid undue portfolio concentration that may contain significant hidden credit risk, and reduce overall credit risk by rerouting credit to more profitable and less risky business lines. In order to set up suitable portfolio assessment procedures, banks should create standards for determining portfolio concentration as well as criteria for determining portfolio composition. To assess possible losses from portfolios, banks should gather information on counterparty rating, chance of default, loss rate given default, and exposure at default

on a per-portfolio basis. Portfolio quality degrades more quickly when there is a high correlation between borrowers in the same portfolio or across portfolios. As a result, information on counterparty and portfolio correlation is crucial for portfolio appraisal.

By following changes in portfolio quality via borrower rating migration analysis and predicting variations in the amount of possible losses from the portfolio across the review period, portfolio assessment examines portfolios from two perspectives. In order to evaluate how the portfolio quality has changed during the review period, portfolio reviews map rating migration data, default data, and possible loss data at subsequent quarterly or half-yearly intervals.

As part of the portfolio review process, it is important to consider the connection between counterparties and portfolios as well as the effects of unfavorable exchange rate fluctuations. Techniques for reducing credit risk generally are not fundamentally different from those used for portfolio risk. Banks should evaluate their risk mitigation strategies and choose the one that best addresses the specific issues revealed by portfolio analysis.

Loan Pricing Based on Risk

Prices For Loans Concept

The risk-based loan pricing includes a risk margin that should be sufficient to reimburse the bank for all of the risks it has taken on, as well as the return on a risk-free asset. Default risk, rating migration risk, credit correlation risk, credit concentration risk, collateral risk, and recovery risk are just a few of the risk factors that are taken into consideration by risk-based loan pricing. The likelihood of default and the loss rate given default, which indicate the likely loss from credit risk, are the most important variables that affect the loan price.

The amount of potential loss that can result from exposures to a counterparty is the main variable that affects the risk-based loan pricing. The basis for differentiating across counterparties when determining lending rates is provided by the default characteristics of loans and the differential degrees of recovery when default occurs. It is impossible to predict which borrowers will fail in advance, but by examining their present risk ratings, we may draw conclusions about their propensity to do so and adjust the loan rate appropriately.

Pricing Principles For Loans

Here is an explanation of the broad guidelines that may be used to calculate risk-based loan prices:

1. The foundation for determining lending rates for loans and advances should be the rating grades given to borrowers. For determining the risk-based pricing of loans to medium-sized businesses and small borrowers, the bank may depend on its own internal risk rating system, and for big and significant borrowers, it may employ, where available, the ratings of reputable external rating organizations.
2. The interest rate on loans should be regulated such that loans with the lowest risk ratings typically have the lowest rates and loans with the greatest risk ratings have the highest rates. The loan rates should be regulated within a predefined range as they are situated between the two extremes. The range of risk margin, or the difference in interest rates between the riskiest and least risky loans, should be consistent with banking industry standards.
3. The main element affecting the risk-based loan pricing is the possible loss on credit exposure. The crucial factors in establishing the risk margins are the internal ratings of the borrowers, the chance of default, and the loss rate in the event of default. The other two crucial elements that affect loan pricing are the financial resources needed to fund credit risk-related activities and the anticipated return on capital.
4. The length of the loans and the interval between repricings of the funds used to sustain a pool of term loans affect the lending rate. The origin of cash is unpredictable, adding to the expenditures. As a result, while determining the loan rate, the cost of funds, which sometimes must be outsourced to address asset-liability mismatches, must be taken into consideration.
5. The rate of default and the amount of loss vary across risk categories, thus the bank must distinguish between the characteristics of loans put in each risk grade when setting risk-based loan pricing. The bank will likely suffer the least amount of losses on loans with a AAA rating, and only very seldom. Similar to loans with an A rating, loans in the BB, B, and C categories may suffer higher losses and do so more often than loans with an A rating.
6. The risk-based loan pricing should include a penalty clause that may be used in the event of early loan payback and insufficient usage of authorized credit limits.

Lender Price Issues

In order to create proper methods for setting risk-based loan pricing, banks should investigate and address the following issues:

1. The first concern is to the availability of trustworthy data to estimate the amount of anticipated loan loss, which is a factor in choosing credit spreads to determine the loan price. There are many models available to determine expected loss, but banks must collect data on the likelihood of default, loss rate given default, and exposure at default for each asset class and each risk grade over a five to seven-year period if they want to measure credit losses using internal models in accordance with the New Basel Capital Accord recommendations.
2. The second concern relates to how unexpected loss from credit exposures is calculated and how it is included into calculations of loan prices. Because it is difficult to assess unexpected loss fairly, banks often neglect the unexpected loss component when determining loan costs. Idiosyncratic default risk, also known as the risk of unanticipated loss, is genuine and does occur, according to studies. Therefore, banks must calculate the unanticipated loss using a credit risk assessment methodology and include it into loan pricing. Since banks utilize credit spreads somewhat higher than market-related credit spreads to establish the loan prices, risk-based loan prices often include a built-in cushion that takes care of unforeseen losses.
3. Whether risk-based loan rates should be rigidly adhered to for all loans and advances is the third point of contention. Due to market competition, there are several loan kinds whose lending rates are set on an as-needed basis. This rule is often applied to retail loans with identical facility features, loans secured by readily obtainable collateral, or loans for certain purposes. By using the risk-based loan pricing as the benchmark, banks may set lending rates for these sorts of loans depending on their intended use, exposure size, and repayment period. Banks may impose higher rates on loans for speculative purposes and loans with longer terms than those for productive reasons and lower rates on comparatively smaller loans and loans with shorter terms. However, in order to achieve a minimal profit from lending, the risk-based pricing for each type of loans should be taken

- into consideration when determining the final rate.
4. The fourth concern is the market's need that some consumers get loans at rates below risk-based rates. For loans falling into various risk categories, banks may determine the minimum lending rates based on the "no profit, no loss" criterion. They can then add minimum spreads to the suggested "no profit, no loss" rates to establish the chargeable rate for particular clients. The "no profit, no loss" cut-off rates should be avoided by banks, unless they are required to lend to low-income borrowers by bank regulators, according to the perspective of interest rate risk management. Banks must make sure that lending rates, even for a chosen group of consumers, are at least marginally higher than "no profit, no loss" rates. Due to business necessity, banks will occasionally set lending rates that are at least equal to "no profit, no loss" rates for public sector enterprises and other corporations that are financially sound and are rated in the AAA, AA, or A categories. This is especially true if there is a chance that these clients will provide a significant amount of non-fund-based business that can offset the loss of interest income.
 5. The final concern is how much money can be given at "no profit, no loss" rates or at rates that are somewhat higher than those but below risk-based loan pricing, if banks are required to do so for a number of reasons. Banks may set a limit on how much money they will offer at these rates, and while doing so, they should consider the low-cost funds they have on hand since the cost of funds plays a big role in determining how much a risk-based loan would cost. The ceiling can be a portion of the corpus made up of interest-free current account deposits, low interest savings account deposits, core amounts of interest-free float funds, lower-term low-cost time deposits, and funds that were obtained at reasonable rates. A part of the corpus may be loaned at rates equivalent to or slightly higher than "no profit, no loss" rates to reduce the loss on interest income; the maximum amount of funds that may be lent at significantly lower rates is the average of these funds over a 12-month period.
 6. The sixth concern is to how far banks should adjust risk-based lending rates to conform to the risk assessment scale. If there is just a little difference in how two risk classes, especially nearby risk grades, perceive risk, is it still required to establish a risk-based loan pricing for each risk grade? In the context of an eight-scale or seven-scale credit risk rating system, it is not practical to adhere to a stringent risk-based loan pricing methodology. Putting the borrowers into broad risk categories and dividing the risk-based lending rates into three or four slabs makes sense from a practical standpoint. It is easy to classify risk grades into broad risk categories when there are only slight variations in risk scores and risk perception. For instance, four risk categories may be created from the seven risk classes established under a seven-scale grading scheme. Risk-based lending rates are divided into four slabs: low risk, moderate risk, fair risk, and high risk. For debtors in the fair risk and high risk categories, there may be an ad hoc provision for a small rate modification. Operationally, it is more convenient for the loan price to be fixed based on a wide risk category. The little changes in lending rates may help lessen consumers' perceptions of prejudice, strengthen their loyalty, and grow the company's market share.
 7. The seventh concern pertains to how much the loan maturity factor may affect risk-based loan pricing while leaving other factors unaffected. Do distinct risk-based loan rates need to be set for short-, medium-, and long-term loans? The increased risk associated with longer-term loans must be taken into consideration by banks when setting lending rates. Since facility features like as loan term are taken into account in the counterparty grading process, the greater risk associated with loans with longer maturities is to some degree reflected in the risk grade. However, since there is an increased risk associated with loans with a longer duration, it is preferable to reduce the risk rating of borrowers who take out medium- and long-term loans by one notch. Banks may include in the higher cost of long-term funds as well as an extra risk premium associated with the length of the loan when determining lending rates for medium- and long-term loans.

Computation of Loan Prices

According to the concept of risk-based loan pricing, interest rates rise as the risk posed by credit exposures rises. The foundation for determining the rate applicable to each risk grade is the risk rating of the borrower, which represents the variation in risk levels

across risk categories. Although the calculation of risk-based loan prices is mostly a mathematical procedure, the final lending rate is also influenced by bank-specific, facility-specific, and risk mitigation-specific elements. Factors unique to each bank include its size and position in the market, sources of funding, loans to deposits ratio, historical cost-income ratio, desired return on assets, and degree of credit portfolio diversification. Facilities-specific considerations include facility structure, loan purpose, amount and caliber of collateral, loan term, prepayment penalty clause, and right of loan recall. Risk mitigation-specific considerations include the extent of loan syndication or loan participation by other banks, the availability of insurance or guarantee, and the availability of derivative instruments for hedging interest rate risk. These factors together affect loan rates.

The following factors make up the risk-based loan price:

1. Money outlay.
2. Service fee.
3. Capital expense.
4. premium for risk.
5. Spread of income.

The return on risk-free assets plus the risk margin are reflected in the risk-based loan pricing. The amount of potential loss that might result from the credit exposure is the main element that affects the risk-based loan pricing. The basis for differentiating amongst borrowers when setting risk-based lending rates is provided by loan default probability and the differing degrees of recovery when default happens. The foundation for adjusting loan rates is the rating of borrowers. The maximum interest rate range between the least and most hazardous credit exposure should be consistent with regulatory requirements and banking industry standards. Long-term loan assistance comes at a higher cost, which should be reflected in the lending rate.

The risk grade specified in the rating scale should be taken into account when granulating the risk-based loan pricing. However, lending rates might be tied to broad risk categories rather than each risk grade on the rating scale for operational ease. Due to market pressure and the extended duration of the loans, exceptions may be granted when determining the risk-based loan pricing. Risk-based loan pricing suggests that lending rates rise as credit risk rises, although risk grade is not the only factor considered when determining the final rate. The ultimate rate is determined by the bank's size, risk tolerance, desired

return on assets, historical cost-income ratio, and degree of credit portfolio diversification. Additionally, the availability of risk-reduction possibilities and collateral coverage affect the loan rate [7]–[9].

CONCLUSION

In conclusion, Investors may analyze the performance, risk, and composition of investment portfolios with the use of portfolio analysis methodologies. Insights into portfolio diversification, risk exposure, and anticipated returns may be gained through mean-variance analysis, CAPM, factor models, and simulation techniques. Investors may improve their portfolios' risk-return trade-offs by using these strategies to make educated choices about asset allocation, risk management, and risk management. In today's complicated investing environment, the use of cutting-edge quantitative tools further improves the precision and efficacy of portfolio analysis.

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A Study on Market Risk Framework

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ABSTRACT: A market risk framework is a crucial component of risk management in financial institutions, providing a systematic approach to assess, monitor, and manage the potential impact of market fluctuations on an institution's portfolio. This abstract provides an overview of a market risk framework, emphasizing its significance, key components, and its role in safeguarding the institution's financial stability. Market risk refers to the potential losses that can arise from adverse movements in market prices, including interest rates, exchange rates, equity prices, and commodity prices. A market risk framework is designed to identify, measure, and control these risks, ensuring that the institution's exposures are within acceptable limits and aligned with its risk appetite.

KEYWORDS: Counterparty Risk, Economic Capital, Liquidity Risk, Market Data Validation, Market Risk Management, Model Validation.

INTRODUCTION

Market risk is the possibility of suffering losses as a result of changes in market risk factors. It has an effect on the capital and profitability of the bank. Unfavorable fluctuations in interest rates, foreign currency rates, security prices, stock prices, and commodity prices lead to a decline in the value of assets and profits. Market risk may be found in both individual transactions and portfolios, such as credit risk. In addition to the derivatives portfolios like the swap's portfolio, options portfolio, and futures portfolio, banks also have to manage market risks in portfolios of investments in government securities, Treasury bills, corporate bonds, and equities. These transactions include the sale and purchase of sovereign securities, corporate equities, foreign currencies, options, futures, and the like. Market risk is primarily present in the trading book because banks buy and sell financial instruments and derivative products in the short term in order to generate profits. However, it is also present in the banking book because banks hold investments in their books for extended periods of time in order to generate profits from interest and redemption values at maturity dates. The movement of the market risk variables may be volatile, and the more volatile they are, the more potential gain or loss there is [1]–[3].

Types of Market Risks

Market risk manifests itself in five ways:

1. Liquidity risk, first,
2. Interest rate risk,
3. The danger of currency exchange,
4. Price risk for equity,

5. Commodity risk.

The bank's investment and trading portfolios are exposed to market risk, which materializes through erosion in the value of assets and earnings when a market risk variable changes, but the commodity risk does not arise in those nations where there is a legal or regulatory prohibition against banks dealing in commodities and commodity futures, with the exception of gold. Let's say a bank has sovereign securities with a face value of \$1 million and a maturity of five years, each with a 3.75 percent annual interest payment. Let's assume further that the financial market interest rate rises to 4% annually and the market value of the security owned by the bank drops to \$995,000 from its face value of \$1 million. The loss of \$5,000 in the security's value may be attributed to market risk. The market value of a security and the rate of interest due on it have an inverse relationship, which suggests that under normal conditions, market prices decrease as the interest rate increases. Consider another scenario where the bank has purchased bonds from a company with a \$1 million face value and a five-year maturity with a floating interest rate of 3% each year plus a three-month London Interbank Offered Rate that is refixed every three months. Assume that on the day of the transaction, the three-month LIBOR was 0.50 percent, making the annual effective interest rate 3.50 percent. The interest on the bonds is refixed at a lower rate of 3.40 percent yearly if the three-month LIBOR drops to 0.40 percent on the interest rate reset date. Market risk is to blame for the profits decline brought on by the interest rate decline.

A bank's trading book often comprises of holdings in gold and financial instruments that are kept with the

goal of trading or risk-hedging. Investments in gold, mutual funds, corporate shares, bonds and debentures, sovereign securities, spot and forward foreign currency positions, and derivative contracts for swaps, options, futures, and other financial instruments are all included. Market risk is the possibility of a loss across the whole investment and trading portfolio as a result of changes in interest rates, exchange rates, or stock prices in the market. Value-at-risk models may be used to assess the expected erosion in the values of trading and investing portfolios. Banks' bottom lines fluctuate as a result of negative movements in financial market conditions. Market risk may significantly reduce banks' earnings in an environment where interest rates and foreign currency prices are very volatile and transaction volumes are high. On their own, banks often engage in aggressive speculative trading of assets and currencies in an effort to profit from unanticipated market fluctuations. Banks expose themselves to a greater level of market risk as a result. Consequently, market risk has three key effects on banks:

1. It depreciates the worth of things financially.
2. It lowers profits as a result of declining interest rates, especially when financial instruments are subject to fluctuating rates.
3. Due to a decrease in the amount of money coming in, liquidity is harmed.

Framework for Market Risk Management

The framework for managing market risk consists of two parts:

Organizational Structure

Procedures and plans for handling the risks associated with derivative transactions, stock exposure, interest rate risk, foreign currency exposure, and commodities exposure.

The following crucial actions must be taken by banks in order to mitigate market risk:

1. Creating methods for identifying market risk and measuring methods.
2. Creating processes for exposure aggregation.
3. Creating a system for evaluating jobs.
4. Setting triggers and restrictions.
5. Establishing frameworks for risk monitoring, risk management, and risk reporting.

In order to protect both individual transactions and portfolios, banks must first identify their market risk appetite and create limits and triggers that are proportionate to their risk-bearing capability. They create processes for categorically defining each component of market risk for each product and

activity, create financial models to value positions and gauge market risk, and set standards for judging the qualitative elements of risk. The measurement models should go through validation testing to see if the methodology used is acceptable and whether the results are accurate.

Second, banks set up a complex risk-monitoring system to ensure adherence to trigger-driven action rules, compliance with specified limits, and transaction execution protocols. They regularly perform stress tests for trading and accrual portfolios as part of the monitoring system to see if the assumptions used in the models to evaluate positions and calculate value-at-risk are realistic.

Thirdly, banks set up a reliable and impenetrable control system and make sure that conflicts of interest are avoided when assigning tasks to operational personnel and monitoring and reporting staff. Banks shall assign validation, back-testing, and stress-testing activities to people unconnected with the investment operations, model development, and software development programs. The control procedure shall ensure that adequate checks exist to detect in time unauthorized transactions and wrong use of discretionary powers by officials, and make it difficult for dealing personnel to conceal unsustainable positions. Fourth, in line with the New Basel Capital Accord criteria, the market risk management framework should incorporate the process for evaluating and monitoring regulatory and economic capital to cover market risk at the conclusion of each day.

DISCUSSION

ORGANIZATIONAL SETUP

The organizational structure for market risk management should adhere to the following five criteria:

1. The power to consent.
2. The power to suggest.
3. The power to manage finances on a daily or weekly basis.
4. Power to control market risk.
5. A support network.

The following organizations should make up the organizational structure for market risk management, in addition to the board of directors and the board's risk management committee:

1. A committee for asset-liability management.
2. An ALM support network.
3. The market risk management board.

4. The department of market risk management.
5. The front, middle, and rear offices.

The board of directors is in charge of developing the company's market risk policies, goals, and vision as well as its market risk appetite, reasonable market risk limits, and trigger points for risk mitigation measures. To adapt to a changing market environment, the board should routinely evaluate the effectiveness of the ALM system and make adjustments to policies and plans. A risk management committee should support the board by supervising all market risk management operations, recommending for approval the market risk management systems and processes, as well as the market risk measuring models and tools. To lessen the susceptibility of the investment and trading position and stop a loss in asset values or profits, the committee should make strategic choices in response to shifting market risk situations. It should evaluate the efficacy of the ALM function, evaluate the outcomes of model back- and stress-testing, and make suggestions to the board for the necessary adjustments.

To manage the balance sheet, banks should establish an asset-liability management committee made up of senior executives. ALCO's makeup and size have to be adaptable and bank-specific. In order to control market risk, ALCO is the bank's most strategically important organizational division. Additionally, banks should create an ALM support group made up of middle-level officials to carry out scenario and risk analysis as well as give information and data assistance to ALCO. To prevent conflicts of interest, the group shouldn't be given a line-of-business responsibility. It should include information from the relevant departments, estimate potential changes in market risk factors, examine the asset-liability mix, assess the effect on the balance sheet in the context of evolving market circumstances, and provide risk-reduction strategies.

A market risk management committee made up of senior executives and department heads should also be present in banks in addition to ALCO. This committee will serve as a liaison between the former and the risk management department. Additionally, they need to create a distinct market risk management division that would serve as the secretary for the board and all committees. An experienced market risk support team should be assigned to the department with the task of creating market risk management strategies and tools that are suitable for the bank's trading and investment profile. Through simulation exercises and scenario studies, the group should determine the effect of market risk on the bank's exposure under various conditions and submit technical reports. The

organization's many market risk-related wings should get help from the market risk management department [4]–[6].

Banking institutions should have a front office, a middle office, and a back office in addition to the committees and the department. The front office will serve as the clearinghouse for transactions involving market risks, matching, managing, and controlling financing and liquidity assistance through asset-liability arrangements and investment support via the sale and purchase of securities.

In line with the set of authorizations given to them, the dealers stationed at the front office must conduct transactions in local and foreign currencies as well as derivative contracts.

The middle office should independently evaluate its exposure to market risk and regularly update ALCO on its findings. The total market risk across the investment portfolio, foreign exchange portfolio, and derivatives portfolio should be tracked and monitored in real-time. Additionally, it should check that the Treasury is adhering to approved limits and risk parameters and submit status reports on market risk exposure to ALCO on a regular basis.

The back office should keep an eye on and oversee how the front and middle offices are operating, keep a clear distance from the dealing room, and make sure that there is a distinct division of responsibilities between the operational and reporting divisions. The back office should implement important controls on market risk activities, including dealing room activities; confirm the specifics of transactions carried out by the dealing room; and cross-check rates, prices, and brokerage from impartial and trustworthy sources. It should exert control over payments and settlements and monitor the value of individual agreements in relation to the established risk limitations.

Market Risk Management

Investment management policy and asset-liability management policy are the two components of the market risk policy. The definition of market risk, a list of the actions and goods that cause market risk, and coverage of all areas of trading and investing operations should all be included in the policy. The bank's appetite for market risk, the amount of capital it wishes to retain to protect against market risks, and who is responsible for the efficient execution of investment and trading activities should all be specified in the policy. It should assess the risks and investment possibilities associated with different forms of investment activities, as well as the

techniques for achieving investment goals. It should also identify the boundaries and triggering events necessary for efficient portfolio management. The technique for identifying, measuring, monitoring, and controlling liquidity risk, interest rate risk, foreign currency exposure risk, and equities and commodities exposure risk should all be included in the policy. In accordance with the New Basel Capital Accord criteria, it should specify the amount of capital that the bank plans to keep to cover market risk as well as the standards for qualitative and quantitative disclosure of market risk.

Vision of Market Risk

Banks are required to have a clear understanding of the market risk-related activities they want to engage in over the short and medium periods and to create a document outlining their market risk vision, which includes the guidelines for conducting trading and investing operations. The market risk policy has an offshoot called the vision document. At the start of each accounting year, banks should develop their investment strategy while considering regulatory requirements, policy directions, investment possibilities, and expected net gains from their investment company. It is advantageous to adopt a medium-term perspective on the domestic and international investment climate and stick to a predefined course. The market risk vision document's guiding concepts should serve as the foundation for the investment policies and strategies, which should also be aligned with the business environment. The solutions should assist banks in selecting investment options that are comparatively less subject to significant market volatility. The market risk vision has to be adaptable and agile in order to keep up with changing market trends. The following guidelines should be followed by a bank as a minimum while performing its trading and investing operations:

1. It must not limit the markets for corporate bonds and stocks for its investment activities. It will manage client portfolios, act as a market maker, and participate in depository transactions in addition to retailing government securities.
2. It will work to maximize investment income by taking risks that are consistent with the goal market risk profile.
3. It will give due consideration to liquidity issues when allocating capital to the investment company. Investment activities must not put the company in a position where it must take unusual

steps to obtain money to pay obligations and liabilities on time.

4. The investment portfolio must be adaptable and include a decent amount of assets that can be sold quickly. In the case of early withdrawal of large deposits and exceptional drawdowns by clients in overdraft and revolving credit accounts, the bank must be prepared to quickly sell assets to fulfill liquidity needs.
5. The bank must maintain a well-diversified investment portfolio, prevent concentration in any way, and hold a variety of financial instruments with diverse coupon rates and maturities.
6. To prevent substantial asset-liability mismatches, the maturity structure of the investment portfolio must coincide with the structure of short-term and long-term funds.
7. In order to generate trading gains without putting the bank at unnecessary or unsustainable risk, arbitrage possibilities that arise in the market should sometimes be investigated.
8. When conducting investment transactions, the bank must adopt a comprehensive approach to the whole risk posed by the counterparty, including both credit and investment exposures.
9. Regulatory requirements, liquidity concerns, market trends, and risk-return perspectives must dictate the percentage of funds deployed between investment and credit activities.
10. Current yield, yield curve, interest rate outlook, liquidity characteristics, redemption loss, maturity basket, and adjusted duration will all be taken into consideration when deciding whether to sell or buy assets.
11. The modified duration of portfolios must be adjustable and set in accordance with the projection for changes in the rate of financial instruments.
12. Investment maturity mix must adhere to reasonable criteria controlling the maximum individual and cumulative gaps between assets and liabilities in various time bands.
13. The bank must adhere to sensible rules for entrance point grading and holding bonds and stocks according to risk grade, as well as maintain credit risk from investments in corporate bonds and shares within reasonable bounds.
14. It must follow clear, well-documented rules for investing in commercial papers and interbank deposits. The total counterparty exposure

limitations must not be exceeded by these investments.

15. It must identify capital market exposure precisely and maintain it within sensible bounds.
16. In line with the idea of diversification, it will make investments in preferred shares, mutual funds, venture capital funds, instruments of securitization, and interbank participation certificates within certain parameters.
17. It must employ the proper derivative instruments to protect against market risks associated with particular counterparties, transactions, and portfolios.

The movement of market risk factors including interest rates, currency rates, stock prices, and commodity prices are unpredictable, which leads to market risk. It lowers the value of the bank's assets and profits and may be found in both the banking and trading books. If interest rates and foreign currency rates are particularly volatile and trading and investment activities are significant, market risk may significantly reduce banks' profitability [7]–[9]. To manage market risk, banks should set up monitoring and control systems, create operating limitations, designate triggers for certain actions, and implement methods and processes for measuring and identifying market risk.

To control market risk, banks should set up distinct committees, functional groups, and support groups. The organizational structure should take into account the need for distinct units to handle operational, developmental, recommendatory, and approval tasks. Banks should create a market risk policy and a market risk vision document that includes guidelines for carrying out trading and investing activities. The market risk policy should include asset and liability management as well as investment management, specify the market risk appetite, and create limits and triggers that are appropriate for the risk-taking capacity. The market risk vision has to be adaptable and agile in order to keep up with changing market trends. Banks should frame their market risk policies with a medium-term perspective of the domestic and international investment climate, and they should choose operational methods that are comparatively less prone to extreme market volatility. When allocating money, banks should maintain an optimal ratio between investment and credit. Regulations, liquidity issues, market movements, and risk-return factors should all be taken into account when determining the ratio. Banks should consider both credit risk and market risk when carrying out

investment transactions that involve the same counterparty [10], [11].

CONCLUSION

In conclusion, financial organizations need a market risk framework to monitor and reduce the possible effects of market changes on their portfolios. Institutions may improve their risk management skills, protect their financial stability, and guarantee regulatory compliance by detecting, measuring, monitoring, and managing market risks. Institutions may make educated choices, maximize risk-return trade-offs, and successfully traverse turbulent market circumstances with the help of a strong market risk framework, backed by suitable governance structures, risk assessment tools, and risk management strategies.

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A Study on Liquidity Risk Management

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ABSTRACT: Liquidity risk management is a critical aspect of risk management in financial institutions, ensuring that they have sufficient cash and liquid assets to meet their financial obligations in a timely manner. This abstract provides an overview of liquidity risk management, highlighting its significance, key considerations, and its role in maintaining the stability and resilience of financial institutions. Liquidity risk refers to the potential inability of an institution to fund its operations and meet its obligations as they come due. It arises from a mismatch between the timing of cash inflows and outflows, as well as from the uncertainty and unpredictability of market conditions. Effective liquidity risk management is essential to mitigate the adverse consequences of liquidity shortfalls, such as reputational damage, funding difficulties, and potential systemic risks.

KEYWORDS: Central Bank Liquidity Facilities, Collateral Management, Funding Liquidity Risk, Liquidity Buffers, Liquidity Coverage Ratio, Liquidity Risk Assessment.

INTRODUCTION

Liquidity Risk Causes

The term "liquidity" refers to the quick availability of cash and other liquid assets at the bank that may be used to finance assets and satisfy payment commitments. The danger of the bank's inability to get liquid cash to satisfy obligations and other commitments when they come up is known as liquidity risk. The following responsibilities give rise to the need for liquid funds:

1. To pay back loans, deposits, and other obligations.
2. To pay for advances and loans.
3. To resolve lawsuits the bank is facing.
4. To pay any future obligations that the bank may incur as a result of a deal.

Being able to satisfy obligations to other banks and financial institutions without running out of liquidity is essential since doing so might have negative effects on the money market and jeopardize the stability of the financial system. Failure to timely collect client payments in one location might have an impact on the bank's other locations, and in the worst case scenario, could spark a run and jeopardize its financial stability. Even if the occurrence is just short-lived, it harms the bank's brand and undermines client trust.

The amount of liquid assets required to sustain operational flexibility is a variable whose value is always changing. A bank must maintain an optimal amount of liquidity, which depends on a variety of variables. Adequate liquidity does not include keeping money in excess of what is needed and forgoing possible revenue from other sources. As a result, while

evaluating the adequateness of liquidity, one should consider both the bank's internal liquid reserves as well as its capacity to get funds under the current conditions at a fair cost.

Liquidity risk is caused by a few different things. One such element is the peculiar behavior of corporate and institutional depositors, who may abruptly and without warning remove money from the bank depending on their available possibilities. Large clients withholding deposits abruptly and unexpectedly when they are not owed money puts great pressure on the bank's liquidity. Banks are not legally required to enable the early withdrawal of term deposits, although they often do so as part of standard banking practice. Holders of term deposit accounts are reassured of liquidity, which boosts their trust and deters them from using alternative choices [1]–[3].

The inability of term depositors to use their choices to renew matured deposits for a new term or to remove them on maturity dates also contributes to liquidity risk. Banks often determine their liquid fund needs based on the assumption that a large majority of clients would renew their deposits at maturity for an additional period. Banks track a historical trend in the renewal pattern of matured term deposits over time. However, the bank may have liquidity issues if some clients decide not to renew their matured term deposits in a manner consistent with prior trends. Funding risk arises as a result of this kind of incident.

Liquidity risk may also result from abrupt pauses in the expected inflow of cash caused by borrowers stopping loan installment payments or counterparties failing to uphold their end of the bargain responsibilities on settlement dates. Liquidity issues result from the time lag between the expectation of

receiving cash and the need for funds to fulfill ongoing obligations. Liquidity risk is also created by the unexpected need for money to pay third parties when contingent obligations pass to the bank as a result of customers failing to uphold their end of financial guarantees, letters of credit, or derivative contracts. The call risk aspect of liquidity is the name given to this sort of risk.

Liquidity risk often results from discrepancies between a bank's assets and liabilities' maturity patterns. Because of the risks associated with a successful rollover of funds during the currency of financed assets or obtaining money from other sources at advantageous rates, it becomes apparent if long-term assets are funded by short-term liabilities to a substantial degree.

DISCUSSION

Liquidity Risk Management Policies and Strategies

Due to variations in asset and liability composition and maturity structure, banks may have different liquidity management strategies. The policy should specify how top management should proceed when dealing with liquidity issues in various market scenarios. A bank should have written liquidity management rules and methods that fund managers may use to give operational flexibility and make it easier to choose sources of funding when necessary. If a bank has a number of branch offices and financial subsidiaries in foreign nations with various operating time zones, managing liquidity becomes more challenging. The liquidity environment across the world, where the bank and its connected divisions operate, must be understood by liquidity management. The technique and approach for managing liquidity throughout the conglomerate should be included in the policy document, along with alternatives that apply to various scenarios and the amount of authority for taking action in an emergency. The bank needs a way to double-check the choices made by fund managers about where to get and how to use money.

The liquidity management policy ought to include at least these conditions:

1. Establishing standards for grouping goods that appear on and off the balance sheet into various time periods.
2. Establishing methods for calculating liquidity.
3. Fixation of individual and cumulative asset-liability gap tolerance limitations for each time bucket.

4. Prescribing a desired combination of investment portfolios and financial instrument maturity distribution.
5. Mechanisms for reviewing the maturity structure of obligations and assets are established.
6. A credit-deposit ratio that is prescribed.
7. Setting a limit on borrowings for call money.
8. Putting up a list of funding choices in terms of cost and importance.
9. Creation of a management information system to provide daily liquidity position statements.
10. Assignment of responsibility and establishment of standards for obtaining funding from alternate sources during emergencies.
11. Prescribing a structure for compliance reporting. The bank should develop liquidity management plans in accordance with the policy directives. "A bank's liquidity strategy should specify specific policies on particular aspects of managing liquidity, such as the breakdown of assets and liabilities, how to manage liquidity across different currencies and nations, how much a bank relies on using particular financial instruments, and how liquid and marketable its assets are. An agreed-upon plan should be in place to address the possibility of both short-term and long-term liquidity problems.

Identification of Liquidation Risks

When a crisis scenario arises, liquidity management does not look for money. It is a task that needs daily attention and thorough preparation to do in order to satisfy funding requirements as they arise. Liquidity managers often have to cope with choppy market circumstances or unpredictable counterparty conduct. As a result, an efficient liquidity management system needs the support of a thorough management information system and a reliable analytical procedure to continuously analyze liquidity requirements.

Banks that are concerned with liquidity, as well as all banks in general, need to have a suitable system in place to spot liquidity issues that might develop over the next few days or at any time. The identification process should identify any possible liquidity issues that might arise within a week, a fortnight, or over a little longer period of time. A review of the bank's assets and liabilities on a certain date might reveal liquidity risk and its level based on four factors:

1. Ratios between certain, chosen assets and liabilities.
2. The amount of financially unstable sources.
3. The accessibility of warning signs for liquidity risk.

4. How much liquidity shortages there are.

Examining the liquidity ratios is one method of determining liquidity risk. The fundamental makeup of a bank's balance sheet serves as the main predictor of prospective and concealed liquidity risk, which may be identified by an in-person examination of certain critical ratios between defined items of assets and liabilities. These ratios will be examined to see whether there are any notable discrepancies between assets and liabilities that may expose a bank to liquidity risk. Ratio analysis serves as the foundation for assessing liquidity and provides a picture of the liquidity situation. Later on in this, these ratios are explored [4]–[6]. Examining the percentage of volatile funds in a bank's total obligation structure is another method for determining liquidity risk. Liquidity risk increases with the ratio of volatile assets to total assets or the percentage of volatile deposits to total deposits. Large volatile funds include call money market funds, government, institutional, corporate, and funds created via certificates of deposit. Furthermore, any single payments beyond a cutoff amount, such \$10 million USD, are inherently volatile.

Searching for liquidity risk indicators or drivers is the third method of determining liquidity risk. By itself, a liquidity issue indicates a bank's financial fragility. A general sign of financial instability is the provision of greater deposit interest rates or bond issue coupons than those made available by other market participants. Market rumors about a bank's financial stability, a decline in performance metrics, and a drop in client loyalty are all indications of rising liquidity risk. Potential liquidity issues may be detected by the downgrade of a bank's rating, the refusal of local or foreign correspondent banks to maintain their connection on regular terms, or their demand for collateral and other banks' guarantees for routine transactions. The bank's inability to satisfy an increase in demand for funds from current borrowers, its requests to counterparties for extensions of time to pay on maturing liabilities, or its unwillingness to permit customers to prematurely withdraw their deposits in violation of standard banking procedure are all indicative of unreported liquidity issues. Another factor contributing to possible liquidity risk is rapid asset development without the support of capital funds or a surge in the volume of nonperforming loans that reduce cash inflows.

Evaluating the liquidity gaps that occur over several time buckets is the fourth method for identifying liquidity risk. Based on residual and behavioral maturity of assets and obligations, liquidity gap is

defined as the difference between cash inflows and outflows in a time bucket. A positive liquidity or maturity gap occurs when the amount of assets in a given time period, such as 0 to 7 days, exceeds the amount of liabilities; a negative liquidity or maturity gap occurs when the opposite occurs, indicating that the amount of cash outflows in that period exceeds the amount of cash inflows. The potential liquidity risk increases with the size of the negative gaps at the short end of the time buckets. The maturity-wise distribution of assets and liabilities must be disclosed by banks as part of the disclosure duty in the balance sheet, according to regulatory guidelines in the majority of nations. It is feasible to determine if a bank's asset-liability maturity structure is vulnerable to high liquidity risk from the maturity gaps shown in the balance sheet.

Measurement Of Liquidity Risk

Monitoring of cash flow and maturity mismatches allows for the measurement of liquidity risk. The liquidity measuring process should accomplish the following two goals:

1. Ongoing disclosure of the liquidity status is required.
2. Analyze how the liquidity situation changes in light of various hypotheses and scenarios.

To determine the degree of mismatches between assets and liabilities with the same maturity, evaluate their liquidity status, and monitor their liquidity gaps, banks must set up an adequate liquidity assessment method. First, they establish standards for classifying assets and liabilities into various time buckets, then they build the maturity ladder of those assets and liabilities in the selected time buckets, and finally they calculate the deficit or surplus of funds in each individual time bucket based on residual maturity or effective maturity, as well as the total deficit or surplus of funds that exist over a given time period, say up to one year.

Asset and liability classification using time buckets

The regulatory/supervising authorities for banks often specify the time periods for asset and liability categorization, and these periods are usually similar across most nations. The standards for determining time buckets are based on accepted procedures and are essentially the same across banks, although there may be some deviations due to variances in the asset-liability structure and bank-specific preferences. To identify cash flow inconsistencies within each time bucket, the assets and liabilities are organized into time buckets based on the anticipated timing of cash flows. In terms of measuring liquidity, the shorter time

bands, or those from 0 to 7 days, 8 to 14 days, and 14 to 28 days, are mostly focused on for cash flow imbalances. The problem arises when deciding the time buckets of those items of assets and liabilities that do not have fixed maturities, like current and savings deposits, which are payable on demand, or overdrafts and revolving credits where customers have the freedom to draw funds at any time.

The assets and liabilities with fixed maturities, like time deposits and term loans, are placed in the respective buckets in accordance with their residual maturities. Due to the possibility of withdrawal of deposits and early loan repayment by customers, even residual maturities of time deposits and term loans are subject to uncertainty, and it may be challenging to accurately pinpoint the time buckets in which these products can be categorized. On the maturity dates, the depositors roll over a significant portion of time deposits with no cash withdrawals. For instance, if a six-month time deposit is rolled over three times on maturity dates, the effective maturity will be two years. In the other direction, a small number of time deposits may be withdrawn by depositors prior to maturity dates causing unexpected cash withdrawals. If a two-year time deposit is withdrawn one year and seven months before the maturity date, the effective maturity will be five months. Additionally, some clients may pay off their term loans ahead of schedule, resulting in unforeseen cash inflows. Each bank experiences these kinds of variations in cash inflows and outflows, however it may be hard to gauge how severe they are. By analyzing historical data and assessing the trend, it is possible to determine the variations to some degree.

Realistic standards must be followed when allocating across time buckets the quantities of assets and obligations that do not have fixed maturities or whose effective maturities vary from contractual or residual maturities. The measuring method must provide a liquidity situation that is reasonably similar to what really exists. When liquidity is inadequate, a bank's activities are at risk of being disrupted, and when liquidity is excessive, revenue is lost. As a result, it becomes very important to establish standards for classifying assets and liabilities into suitable time buckets. Banks must conduct empirical analyses of the historical behavior of relevant assets and liabilities over a three to five-year period in order to establish standards based on the observed trend. Banks should conduct studies every six months since customer behavior is always changing owing to shifting market conditions. They should also make sure that the

standards and assumptions used to divide assets and liabilities into time buckets are consistent with the current circumstances. Demand deposits to identify the stable component that is always deposited with the bank and the volatile portion that varies sometimes.

1. Time deposits To calculate the typical rate of renewal and early withdrawal of matured time deposits.
2. To determine the typical proportion of money lost because of the use of guarantees or payment obligations under letters of credit or derivative contracts.
3. To determine the seasonality of demand for finances, look at overdrafts and revolving credits.
4. to determine the volatile and core components of approved credit limits.
5. to determine how the undrawn part of approved credit limits is being used.
6. Term loans To determine the typical proportion of fixed-term loans repaid early.

In order to classify assets and liabilities into the appropriate time buckets based on behavioral maturities rather than contractual maturities, banks should identify the items of assets and liabilities that are known to have a core portion and a volatile portion. They should also conduct periodic studies of those items to determine the behavior pattern. Depending on the kind of item, the volatile component should go in the first and second time buckets, the core portion in the later time buckets, and the remaining things should go in the appropriate maturity buckets.

Analysis of the Liquidity Gap

Analyzing the difference between cash inflows and outflows across various time periods is the most popular way to assess liquidity. According to the expected timing of cash flows, banks should build a maturity ladder to arrange various assets and liabilities in the appropriate time buckets, identify any liquidity gaps, and analyze the liquidity situation in each time bucket. Banks should evaluate structural and dynamic liquidity deficits on two different evaluation axes. Bank supervisors and regulators often impose structural and dynamic liquidity maturity ladders [5]–[7].

Analyzing the structural liquidity gaps indicates the mismatches in maturity between assets and liabilities as of a certain date. The estimated future fund flows are placed in different time buckets in accordance with the behavioral maturity pattern of other assets and liabilities that have core and volatile maturities, and the structural liquidity statement is constructed by placing

cash inflows and outflows in different time buckets in accordance with actual residual maturities of those items of assets and liabilities that have fixed contractual maturities and which are not influenced by customers' options.

The dynamic liquidity statement of assets and liabilities is generated to analyze the net financing needs throughout a selected period, often up to a time period of 90 days, and presents the short-term liquidity situation on a dynamic basis. The dynamic liquidity situation is evaluated in light of anticipated company expansion and ongoing financial obligations for the next three months, and it is compared to the anticipated rise in resources to satisfy the need for money. Based on present and forecast statistics, the gaps between the inflows and outflows of money during the next three months will demonstrate any potential surplus or shortage in funds at various times in time.

Structure And Methods For Liquidity Management

Liquidity management entails determining the sources from which the funds will be obtained in order to meet both known sources of liabilities and occasionally occurring unanticipated demands for funds that occur during the normal course of business. The success of obtaining funds at a reasonable cost relies on a bank's present financial situation and the general state of the market. Reliability of the sources and the cost of funds are essential to the liquidity planning process. The market's view of a bank's position and the rating given to it by credit rating agencies are indicators of its financial health. A decline in market status or rating may negatively impact its capacity to get liquid money quickly and affordably.

Structure for Liquidity Management

A bank must maintain sufficient liquidity at all of its locations, including those where it owns or controls partner businesses. Since there is a close relationship between liquidity risk and other types of risks, such as credit, market, operational, and reputational risks, it is safer to implement a centralized liquidity management system in which the bank's central treasury or the funds management department in the head office will oversee the liquidity management function. Examples of distinct risk events that might have a big effect on liquidity include a rise in the volume of nonperforming loans, erratic changes in interest and foreign exchange rates, a breakdown in operational systems, and bad press about the bank. Individual company units or affiliated concerns find it challenging to include all likely unfavorable occurrences in their own liquidity

management systems. Strong management information system support is needed for liquidity management in order to collect pertinent data from all locations and assess the liquidity status in real time across all currencies the bank deals in. Because the central treasury can accurately predict the demand for and supply of money at various points in time, working closely with all company leaders and linked concerns, a centralized liquidity management system is less susceptible [6]–[8].

Approaches to Liquidity Management

The stock strategy and the cash flow approach are two methods for addressing the liquidity risk. With the stock strategy, built-in protections are put in place to guarantee that a bank has enough liquid assets in various forms on hand at all times to satisfy its financial obligations. This goal is accomplished by following a few defined ratios between various assets and liabilities that provide the fundamental framework of liquidity in a bank. The second method is known as the cash flow technique, and it involves calculating the net deficit in liquidity over various time periods by subtracting cash inflows from cash outflows. From there, plans and strategies are created to cover any funding gaps that are anticipated to appear over time. Additionally, the financial situation in important company locations is evaluated, surplus pockets are found, and plans are created to move money from surplus to deficit pockets in advance to reduce borrowing costs.

Correctly estimating the movements of on-balance-sheet and off-balance-sheet items of assets and liabilities in the near future is essential to ensure the accuracy of cash flow predictions. Important variables that affect the cash flow prediction include the demand for new loans, requests for credit limit increases, drawdown under sanctioned limits and standing obligations, early withdrawal of time deposits, early repayment of term loans, and utilization of put and call options by counterparties. Therefore, it is crucial to periodically perform empirical studies of the behavior pattern of certain selected assets and liabilities and utilize the information on behavioral maturity patterns to provide accurate projections of cash inflows and outflows [9], [10].

CONCLUSION

In conclusion, in order to preserve the stability and resilience of their operations, financial institutions must perform the crucial task of managing liquidity risk. Institutions may proactively manage liquidity

risks and guarantee the availability of sufficient financing to satisfy their commitments via effective identification, measurement, monitoring, and contingency planning. Financial institutions may improve their capacity to resist market shocks, maintain stakeholder trust, and contribute to the overall stability of the financial system by putting into practice effective liquidity risk management procedures and adhering to regulatory regulations.

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A Study on Ratios Between Assets and Liabilities

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ABSTRACT: The ratios between assets and liabilities are fundamental financial indicators used to assess the financial health, stability, and risk profile of an entity, such as a company or financial institution. This abstract provides an overview of key ratios that measure the relationship between assets and liabilities, highlighting their significance, calculation methods, and their role in financial analysis and decision-making. The ratios between assets and liabilities provide insights into the structure, efficiency, and risk exposure of an entity's balance sheet. These ratios help evaluate the entity's ability to meet its financial obligations, assess its leverage and solvency positions, and gauge its capacity to generate returns on its assets.

KEYWORDS: Asset-Liability Ratio, Current Ratio, Debt-To-Asset Ratio, Equity-To-Assets Ratio, Interest Coverage Ratio, Liquidity Ratio.

INTRODUCTION

The next paragraphs provide an explanation of the ratios between a few assets and liabilities that are significant when using the stock strategy.

Loans to Total Assets Ratio

Due to the illiquid nature of loan assets, the factor of illiquidity in the bank's operations increases as the ratio of loans to total assets rises. Compared to loans, investments are easier to designate as assets and are more liquid. There isn't a perfect loan-to-asset ratio since it differs across banks. If there is a readily available secondary market for the sale of loans, then a loan-to-asset ratio that is larger than the historical average for the banking sector is acceptable. A solid banking practice is to always maintain a reasonable ratio between investment assets and lending assets. Since a bank cannot significantly reduce liquidity to produce better returns on assets since failing to pay obligations on time may result in bankruptcy, the scope of the trade-off between liquidity of assets and return on assets is constrained. A adequate amount of marketable liquid assets should be on hand at all times by the bank to cover both expected and unforeseen obligations. The loan asset ratio is influenced by business possibilities, the relative liquidity of available alternatives for allocating capital, the returns on investments and loans, and the likelihood of default [1]–[3].

Total Assets to Prime Assets Ratio

The liquidity of the bank's operations increases as the ratio of prime assets to total assets rises. The bank's

own cash balance, credit balances with other banks, investments in Treasury bills and dated government securities, quoted and easily tradeable stocks and bonds, and short-term money market placements are all examples of prime assets that are either cash or easily convertible into cash. As there is a trade-off between liquidity and the risk-adjusted returns on financial instruments to some degree, a prime asset ratio that is too high may lower the bank's profitability.

Liquid Asset to Short-Term Liability Ratio

Liquidity risk decreases when the ratio of liquid assets to short-term obligations rises. Short-term obligations are debts owed to clients, banks, and other counterparties that are required for payment soon generally within 30 days. Liquid assets are primary assets, excluding securities that are "held to maturity." The marketability feature of liquid assets should be taken into consideration when determining if this ratio is reasonable.

DISCUSSION

Ratio of Short-Term Liabilities to Total Assets

Due to the predominance of short-term liabilities in financing medium- and long-term loans, the potential liquidity risk increases with the ratio of short-term obligations to total assets. The bank must hunt for cash from other sources to meet the short-term obligations' due dates if the duration of the assets is greater than that of the short-term liabilities. If depositors and fund providers fail to renew short-term commitments, particularly short-term deposits and borrowings,

liquidity risk develops. Alternative funding sources could be unreliable and pricey.

Core Deposit to Loan and Advance Ratio

The liquidity risk increases when the ratio of core deposits to loans and advances decreases. Depending on how loans and advances are set up, a bank's liquidity issues might range in severity. If the majority of the credit portfolio consists of fixed-term loans, the bank may reduce the liquidity risk by recording obligations with a similar term structure, known as back-to-back financing. Since banks often maintain a sizable portfolio of advances, the majority of which are in the form of working capital limits—a kind of revolving credit that is renewed yearly and is thus fundamentally long-term in nature—this kind of perfect circumstance virtually does not exist. Long-term capital must be available as backup for these kinds of loans and advances. Since there is virtually any secondary market for the selling of loans at a decent price in case of necessity, the credit portfolio is often unstable. The problem is made more difficult by the dearth of institutional fund providers that can provide funds at the required maturity and cost for a bank. Consequently, core deposits, which typically remain with the bank, and other long-term liabilities should provide the majority of the funding for medium- and long-term loans and advances. A reasonable amount of outstanding term deposits based on the rollover pattern, new term deposits based on the past accrual rate, and an estimated proportion of floating funds can all be combined to form core deposits for operational convenience [4]–[6].

Volatile Liability to Total Assets Ratio

The risk to liquidity increases with the variable liabilities to total assets ratio. Large institutional and corporate deposits as well as short-term market borrowings are examples of volatile liabilities. Large wholesale deposits are significantly less common, and their owners often seek for better returns and safer holdings. These deposits are prone to volatility and are often withdrawn without warning. This percentage need to be reasonable and based on a bank's prior performance.

Investments to Purchased Funds Ratio

Liquidity risk will increase as the ratio of investments to bought funds rises. The acquired funds, which include call money and term money market borrowings as well as certificates of deposit (CDs), are of a short-term character and are often offered at rates higher than card rates. The majority of investments

often take the form of sovereign securities and bonds, which are difficult to sell at a reasonable price and on time since the market for their disposal is typically unidirectional. If the bought funds are used to create an investment portfolio with a longer term, the liquidity risk will be larger.

Component for Foreign Currency

Banks take on short- and medium-term foreign currency loans from other banks, financial institutions, and international financial agencies as well as short- and medium-term foreign currency deposits from regular consumers, financial institutions, and big businesses. They provide their local and international clients term loans, revolving credits, and off-balance-sheet facilities in foreign currencies. In addition, they pay their correspondent banks back in foreign currencies for fulfilling obligations on their behalf. In order to fulfill their obligations on schedule, banks must keep sufficient liquidity in foreign currencies.

A system that assures appropriate availability of liquidity in foreign currencies that a bank trades in should be included in the liquidity management framework. When deposits and borrowings made in foreign currencies are converted to domestic currency and used for domestic operations, inflows and outflows of domestic currency should be categorized according to when they occur in order to determine the net financing position. Domestic currency is changed into foreign currencies for payment when foreign currency obligations expire. The two kinds of transactions mentioned above both include currency risk. According to the movement of exchange rates on the settlement dates, if the obligations in a certain currency exceed the assets in that currency, the subsequent currency mismatch or the maturity mismatch may result in loss or gain. If the bank is unable to get enough foreign currency without suffering significant losses as a result of the unfavorable exchange rate, the mismatches provide a liquidity risk. During the 1990s Asian financial crisis, this pattern was evident. Therefore, it is essential to reduce currency mismatch by hedging activities to reduce the possibility of liquidity risk. It is not required for a bank that trades in numerous foreign currencies to store money in each one; instead, it may keep money in four or five major currencies that are most used in its daily operations and are reasonably stable.

Liquidity Management in A Less Conventional Setting

Every day, market circumstances have an impact on banks' liquidity profiles. Under typical market circumstances, the behavioral pattern of assets and liabilities that has been developed via empirical research to calculate cash inflows and outflows in various time periods may still hold true. However, in turbulent market situations, banks' liquidity profiles quickly shift, therefore they should have proactive liquidity management policies and methods that are in line with both conditions of certainty and uncertainty. Under typical market situations, structural liquidity and dynamic liquidity statements are analyzed in order to perform static and dynamic liquidity assessments, respectively. When a bank is faced with extraordinary circumstances, it is necessary to revise the assumptions that were established for the assessment of cash flows under various time periods. These assumptions are based on the residual and behavioral maturities of assets and liabilities and are valid under normal market conditions. Therefore, an extensive framework for managing liquidity should include preparation for potential solutions to close gaps in liquidity and evaluation of such gaps under various situations. "Under each scenario, a bank should attempt to account for any material potential large positive or negative fluctuations in liquidity. These situations must take into consideration both internal and external forces.

The scenario analysis is predicated on the idea that cash flow behavior varies across many scenarios, and that the timing and magnitude of cash flows would alter in accordance with the assumptions made for each scenario. Under the following circumstances, banks should set up a system for managing their liquidity that addresses liquidity assessment:

1. Typical situation.
2. Crisis scenario unique to banks.
3. Crisis in the market.

Ordinary Situation

In a typical situation, managing liquidity entails giving volatile liabilities more attention and aligning asset maturity with obligation maturity. In order to lower liquidity risk, banks should lessen their reliance on volatile liabilities to finance assets and adhere to the following fundamental precautions:

Use wholesale deposits to finance assets with a similar maturity. Set the ratio of medium- and long-term loans in accordance with the level of core deposits and short-term borrowing of funds. To cover unforeseen

withdrawals of deposits and drawdowns in overdraft and renewable short-term accounts, invest a portion of the money in Treasury bills and short-term commercial papers that can be swiftly sold. Keep in frequent contact with clients who have access to significant credit lines, find out when money will be withdrawn from them, and make the necessary arrangements to cover their funding needs when they arise. Establish goals and come up with plans to borrow money from different sources including the central bank, other banks, and financial institutions as well as the call and term money markets.

Scenario of a Bank-Specific Crisis

Liquidity management in a bank-specific crisis scenario include planning for potential liquidity stress events and developing response plans. When negative occurrences inside the bank prevent cash inflows from continuing, a liquidity crisis results. Customers' abrupt withdrawal of wholesale deposits, a run on the bank's accounts as a result of bad press, the unexpected termination of large-value time deposits' rollover arrangements at maturity, the failure of counterparties to repay sizable loans, a downgrade in the bank's rating, and other factors can all trigger a crisis. A portfolio with a large concentration of assets that quickly lose quality and have many defaults may also experience a liquidity crisis. Banks should rebuild cash flows under a variety of assumptions, such as the occurrence of a single liquidity stress event, two or more events concurrently, or a combination of events that reflect the worst-case scenario, in order to analyze the effect on liquidity in bank-specific crisis situations. As soon as warning signs indicate that a liquidity shortage is likely to occur soon, they should take preventative action to lessen the volatility of money leaving the organization while concurrently developing contingency plans to deal with the crisis.

1. Reducing the bank's dependence on large and unstable deposits is one step the bank should take to cope with the problem.
2. Limit the use of short-term borrowing to finance long-term investments. Sanctions to freeze loans are in the works.
3. Where feasible, restructure the credit facilities that consumers now use.
4. Create backup plans to increase its resources in case of emergency.

List the potential means of raising money, such as selling stocks, selling loans, securitizing assets, buying money, and so on, and compare each to the amount of

money needed and the time frame for which it must be accessible in order to weather the storm.

Market Crisis Hypothesis

Because banks have little control over the events that disrupt the financial system's functionality, managing liquidity amid a market crisis is more difficult. An export-import bank and other refinancing institutions' withdrawal of refinancing facilities, the tightening of monetary policy and liquidity adjustment facility by the central bank, the failure of one or more significant players in the financial market to settle liabilities on time and the ensuing contagion effect, the development of an economic and financial crisis leading to a loss of investor confidence in the financial system are all possible causes of market crises. Cash outflows due to obligations that are off-balance-sheet, such as drawdowns under standby agreements, may significantly rise during a market crisis, while at the same time, the amount of excess money in the market decreases, restricting the bank's access to the market. Establishing effective preventative measures and predicting the form and timing of events that lead to a market crisis is challenging. In the event of a market crisis, the price of liquid assets becomes less important since maintaining client trust throughout the crisis depends on keeping one's obligations. The bank should create blueprints of plans for each potential market crisis event, assigning responsibility to authorized officials within the organization to choose the options to react to the situation quickly. These plans should include workable options for augmentation of funds.

Planning for Liquidity Contingency

If unexpected liquidity stress events occur, banks should have a backup plan in place to handle a liquidity crisis. The following elements should be part of the strategy to address liquidity issues under challenging circumstances:

1. Policies.
2. Strategies.
3. Authorities.
4. Responsibilities.

The contingency plan must contain an evaluation of the likelihood and severity of various liquidity stress events, as well as their effects on cash inflows and outflows, and how they would affect the bank's operations. Banks should develop strategies for handling problems brought on by liquidity stress events, as well as the sources of backup financing and the order in which to utilise those sources. The strategy considered to address situations of market- and bank-

specific liquidity crises should be in line with the plan. The availability of accurate information, internal data on the cash flow position, and external data on the liquidity position in other banks and the financial market in time to determine that an emergency situation has developed on the liquidity front is the most crucial requirement for initiation of action under the contingency plan. Identification of a liquidity problem and the creation of workable backup plans depend heavily on comprehensive and robust management information support [7]–[9].

Asset resolution and liability control are the two elements of a contingency plan, respectively. After learning about the possibility of a distressed sale, the bank should have plans for asset disposal that include the assets for sale in order of priority. Guidelines for asset composition and maturity restructuring, which may result in principal loss and profits erosion, should be included in the plan. For instance, the bank could have to sell government securities and corporate bonds with lengthy maturities at market values that might be lower than the prices paid for the acquisition, and then buy government Treasury bills with a much shorter term and lower coupon rates for an identical amount. The bank must also come up with plans to manage fluctuations in cash outflows that arise from the unplanned actions of major depositors and other money providers. It should communicate with them often to reassure them that their money is secure and deter them from exercising their right to leave during a crisis.

In order to establish priorities for funding acquisition in the contingency plan, the bank should evaluate projected liquidity assistance from other sources as well as the reciprocal agreements for credit support from other banks and financial organizations. Central banks typically do not recognize these options as alternative sources of funding under the contingency plan. These options include borrowing against collateral, using the liquidity adjustment facility to replenish funds, and assistance under the lender of last resort provision.

Risk Testing Under Stress for Liquidity Funding

Banks should regularly conduct stress tests to assess the risk of financing liquidity. Stress tests should be conducted on a regular basis in accordance with the bank's own assessment of the liquidity risk, the asset-liability structure, the number of business locations, the bank's rating, and the market position. Stress tests assess the risk proneness of the bank's asset-liability structure in terms of liquidity characteristics and

severity of impact on profit and capital under varying assumptions of cash outflow events, whereas liquidity assessment under bank- and market-specific crisis scenarios deals with abnormal situations. Stress tests are useful tools for identifying unsustainable asset and liability components, such as concentrations of volatile deposits, large quantities of illiquid assets, and a high degree of maturity mismatches, as well as for evaluating the effects of fluctuations in cash outflows on the operations of the bank. There are many methods and approaches for managing liquidity risk; they are mutually supportive. They include the liquidity assessment under various scenarios, the liquidity contingency plan, and the stress testing of liquidity funding risk.

A sensitivity test and a scenario test are the two kinds of stress testing that banks should do. One risk aspect at a time is taken into consideration for the sensitivity test. The sensitivity test evaluates the effect on the bank if withdrawals of such deposits occur to the level of 50%, 40%, or 30% of the sums held, for instance, if unexpected and premature withdrawal of substantial time deposits is believed to be a risk factor. The scenario test calculates the effects of applying two or three risk factors at once. The scenario test reveals the impact on the bank from the simultaneous application of these three risk elements, for instance, if we assume that 30% of retail deposits are abruptly withdrawn by customers, 20% of liquid assets are sold at a 10% discount to make up the liquidity shortfall, and 30% of matured time deposits are rolled over at an interest rate that is higher by 100% over the prior rate. By moving one or two assets and liabilities backward from later time buckets—which are impacted by the stress testing assumptions to the first and second time buckets, the stress testing is conducted.

Let's say the bank has a \$100 million wholesale deposit that is categorized as lasting between three and six months. As of right now, if the client requests a quick withdrawal of 50% of the wholesale deposit, there will be a money outflow of \$50 million, which is moved to the 0 to 7 days time bucket. Let's assume further that the bank wishes to sell Treasury notes for the same amount in order to make up the difference in cash outflow. As a result, the \$50 million investment in Treasury notes that was previously kept under the 3 to 6 months' time bucket is now held under the 0 to 7 days' time bucket. If there aren't many buyers of Treasury notes on the event day, the sale could only bring in US\$45 million, incurring a US\$5 million loss. If a time deposit of \$5 million matures for payment at the same time, the bank may convince the depositor to

roll it over for three months to make up the shortfall of \$5 million. In exchange, the bank agrees to pay an extra \$12,500 in interest over the course of the three months. As a result, the bank suffered a loss of \$5,012,500 according to the stress testing of the liquidity funding need based on the simultaneous application of three assumptions, which would have an effect on the bank's profit.

There are four phases in the process of conducting stress testing. First, based on the residual and effective maturities, the structural liquidity statement of assets and liabilities should be built with reference to a certain date. Second, in line with the stress testing assumptions, the relevant liabilities amounts should be moved to the first, second, and third time buckets. The amount of the liquidity shortfall should be calculated up to the chosen time zone in step three, and according to the assumptions made in step four, the amount of assets that need to be sold to cover the liquidity shortfall should be moved from the respective time buckets to the first, second, and third time buckets. The relevant sums should be under the proper time buckets if the bank chooses to roll over one or two liability items. The net effect on the bank's profit should then be determined in order to evaluate the risk associated with the financing of liquidity.

By tabulating the related assets and liabilities under the relevant time buckets, the stress test should be performed with reference to various time zones. The time zone that is chosen often correlates to how long the stress scenario is anticipated to last. The amount of extra economic capital required under Pillar II of the New Basel Capital Accord should be calculated by measuring the effect of stress testing liquidity funding under various assumptions.

The bank should determine the risk elements that should be taken into account while conducting a stress test on the liquidity funding risk. The risk factors are typically those that increase the likelihood of a liquidity risk, such as erratic behavior from institutional fund providers and large time depositors, a decline in the bank's financial position, a rating downgrade that reduces depositor confidence, rumors and bad press about the bank that cause deposits to flee, supervisory action against the bank under a prompt corrective action framework, and so forth [10]–[12].

Control and Monitoring of Liquidity Risks

Although ALCO has overall responsibility for managing market risks, including liquidity risk, the middle office has independent oversight of operational

divisions' day-to-day management of liquidity, including adherence to policies, strategies, and restrictions for managing liquidity risk. Preparing structural liquidity statements on a weekly or fortnightly basis and critically analyzing the liquidity picture in light of liquidity gaps arising in different time buckets are the typical methods for monitoring liquidity risk. At least five factors should be considered while monitoring the liquidity risk:

1. Emergence of indicators of liquidity risk. propriety of tolerance thresholds.
2. The occurrence of noteworthy occurrences. the reliability of assumptions.

Availability of foreign currencies

Indicators of Liquidity Risk Emerging

The structural mismatch between assets and liabilities that has the potential to lead to a significant liquidity risk should be identified by banks using appropriate ratios between the major items of assets and liabilities as benchmarks. In section 17.6, an explanation of these ratios was provided.

The fundamental tenet that guides the prescription of these ratios between certain assets and liabilities is that:

1. Beyond an acceptable threshold, long-term assets are not financed by short-term obligations.
2. The ceiling for asset growth is determined by the size of client deposits.
3. Generally speaking, the maturity basket of assets and deposits match up.
4. Maintaining a readily available supply of liquid assets to satisfy short-term commitments is a priority that cannot be compromised.
5. Purchased money do not develop into a consistent source of revenue and liquidity risk.
6. A poor business strategy is the aggressive extension of loans without the support of consumer deposits.

In order to discover signs of liquidity risk, banks should aggregate sensible ratios from monthly and quarterly balance sheets and evaluate them. The ALCO support group should keep an eye on them to see whether the sensible limits are going over the line, and if they are, recommend the package of corrective activities needed to return to the prescribed ratios.

CONCLUSION

In conclusion, the ratios of assets to liabilities are crucial financial indicators used to assess the solvency, risk exposure, and financial stability of a business.

These ratios provide light on the balance sheet's composition, the level of leverage, and the capacity of the firm to pay its debts. Investors, creditors, and financial analysts may analyze risk levels, make educated judgments, and track the financial performance and stability of organizations across numerous sectors by studying these measures. Other ratios, such as the total liabilities-to-assets ratio, return on assets, and return on equity, similarly evaluate the connection between assets and liabilities from various angles and provide important information about the effectiveness, performance, and risk management of an organization.

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Appropriateness of Tolerance Limits

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ABSTRACT: *Tolerance limits, also known as risk tolerance limits or risk appetite limits, play a crucial role in risk management by defining the acceptable level of risk an organization is willing to undertake. This abstract provides an overview of the appropriateness of tolerance limits, highlighting their significance, factors to consider in setting them, and their role in managing risk effectively. Tolerance limits represent the boundaries within which an organization is comfortable operating, considering its risk appetite, strategic objectives, regulatory requirements, and stakeholders' expectations. These limits serve as guidelines for decision-making, allowing organizations to identify and evaluate risks, allocate resources appropriately, and avoid excessive exposure to risk.*

KEYWORDS: *Acceptable Risk Level, Compliance Requirements, Control Environment, Risk Appetite, Risk Management Framework*

INTRODUCTION

In compliance with the regulatory directives, and in line with their business profiles and risk management philosophies, banks should establish tolerance thresholds for liquidity gaps in different time buckets. The supervisory authority's tolerance limitations should be regarded as the upper and lower bounds. Due to the short amount of time available to address a high degree of mismatch, the tolerance limit, which is the ratio of the aggregate of cash outflows in a given time band to the negative liquidity gap in that time band, is more important towards the lower end of time buckets. The tolerance limits for the first three-time buckets typically fall between 10% and 15%. In order to preserve balance in the maturity pattern of assets and liabilities, banks should define a cumulative tolerance limit with regard to the top end of the time buckets [1]–[3].

The officials in charge of keeping an eye on and managing the liquidity position should measure the liquidity gap in each time bucket on a daily basis as well as the cumulative gap in time buckets up to three years, and then they should analyze the significance of the gaps in the context of other sources that can be used to replenish the liquidity. The examination of the liquidity gap should point out significant imbalances, explain why they exist, and provide solutions within a certain time limit. To decrease liquidity gaps, changes should be made to the maturity profile and composition of assets and liabilities. Banks have a variety of tools at their disposal to address temporary liquidity issues, including the ability to convert foreign exchange holdings into local currency, borrow on the call and term money markets, issue certificates of

deposits, negotiate bulk deposits with clients, and more. The prevention of funding source concentration is a crucial component of liquidity management. Banks should periodically examine the appropriateness of tolerance limits and adjust them within the outer limits set by the supervisory authority in light of the scenarios that are expected to develop under bank- or market-specific crisis conditions. A bank's tolerance limit structure must be compatible with its liquidity profile, market volatility trend, size, geographic reach, and the kinds of goods and services it provides. Lower tolerance limits will be safer if the financial market is weak and volatile and players are unidirectional, with the majority of them tending to borrow or lend at the same moment to earn rapid profits via arbitrage operations or the temporary placement of money. Liquidity risk from liabilities maintained at the lower end of the time buckets will be higher if wholesale deposits and short-term money market borrowings are key items on the liability side and overdraft limits and renewable credits are prominent things on the asset side. It would be wise to prescribe minimal tolerance limits in such circumstances.

DISCUSSION

Occurrence of Significant Events

Banks may experience a sudden deficit in liquidity, which may sometimes be significant, if unforeseen circumstances occur or a decline in standing obligations materializes. Examples of important occurrences include:

1. Committing significant scams.

2. Big corporate or institutional time deposits that have been prematurely withdrawn.
3. Failure of a participant in the financial market to refund call money or term money by the deadline.
4. Due to market instability, borrowers make a number of substantial loan repayment defaults.
5. Large, unforeseen liabilities that have developed for the bank as a result of transactions or agreements that are not shown on the balance sheet.

Periodically reviewing key prior events that occurred in the bank, the liquidity monitoring team should determine if they were remarkable and rare occurrences or whether they were likely to happen again. The team must evaluate the frequency, seriousness, and amount of previous big incidents, as well as the amount of money needed on each occasion to cover the liquidity shortage. Additionally, it should assess the cost-benefit ratio of the bank's reaction to the circumstances in terms of the money replenishment expenses, the revenue lost, and the missed business prospects. If an incident occurs that alters the public's impression of a bank, the aftermath must be carefully examined from the perspectives of potential deposit flight and the maintenance of the unfavorable reputation, and necessary corrective action must be done.

Admissibility of Premises

In order to classify certain assets and liabilities into distinct time buckets, assumptions are made about their core and volatile components as well as their behavior. These presumptions are based on findings reached by looking at historical data on certain assets and liabilities of the bank. For instance, if empirical research shows that average withdrawals from savings deposit accounts typically stay within 15% of credit balances and those from current deposit accounts typically stay within 20%, these variable portions are classified as volatile components and split into time buckets of 0 to 7 days and 8 to 14 days. The remaining 85% of savings account balances and 80% of current deposit balances are categorized as core components, are held with the bank for extended periods of time, and are distributed appropriately between the "over 6 months to one year" and "over 1 year to 3 years" time buckets. The necessary quantities of time deposits are put in the appropriate time buckets according to behavioral maturity rather than residual maturity if 50% of retail time deposits of varied maturities are rolled over on maturity dates by customers. On the

basis of historical research regarding the seasonal pattern of drawing of funds, the core and volatile parts of unused overdrafts and revolving credits, whose outstanding amounts vary within sanctioned limits, are identified. The core elements are put in somewhat longer-term maturity buckets while the volatile sections are put in shorter-term maturity buckets. Reliable conclusions about the behavioral maturity pattern of specific assets and liabilities drawn from historical data analysis are essential to guaranteeing the correctness of the calculation of the liquidity gap under different time buckets. At least every two years, the liquidity monitoring team must verify the accuracy of these findings and presumptions in light of the actual behavior of the relevant assets and liabilities and make the necessary revisions [4]–[6].

Foreign Exchange Availability

The liquidity situation of a bank's foreign currency assets and liabilities, including obligations to other related entities operating overseas, must be independently monitored. The monitoring team must examine the trend of a bank's foreign currency obligations as they approach maturity throughout various time frames, such as up to 15 days, one month, and six months, and confirm the measures taken to fulfill those commitments. Mismatched currency positions are a source of currency risk, liquidity risk, nation risk, and settlement risk. Foreign currency mismatch is also a source of these risks. In order to properly prepare for timely payment of foreign currency obligations, banks should separately produce structural liquidity statements for their foreign currency assets and liabilities, identify any liquidity gaps, and fill those gaps. In order to show the entire liquidity situation of the bank as a whole, the foreign currency assets and liabilities must also be translated into local currency and interpolated into the structural liquidity statement.

Since a bank's failure to complete payments and settlements on time may cause panic among clients and other financial sector players and send signals about its financial instability, liquidity is essential to the stability of a bank's operations. If a bank has branches in other nations with various time zones, managing liquidity becomes more challenging since liquidity needs to be maintained on a worldwide scale. The key liquidity risk concerns include the erratic conduct of significant depositors, uncertainty over the exercise of options by term depositors on maturity dates, unexpected reductions in sanctioned loan limits, and the sudden need for money to pay off contingent

obligations. Additionally, significant liquidity issues are brought on by large differences in the maturity patterns of assets and obligations.

The key indication of prospective and concealed liquidity risk is the fundamental makeup of a bank's balance sheet. Sudden liquidity issues are brought on by a high proportion of volatile funds to total assets and the appearance of liquidity risk events like rating downgrades and bad press. Cash flow and maturity mismatches are two ways to identify liquidity risk. In order to detect negative cash flows in various time buckets, liquidity assessment basically entails comparing asset-liability maturities and calculating maturity gaps.

Dynamic liquidity and structural liquidity are the two platforms used to evaluate liquidity risk. Dynamic liquidity analysis looks at the net financing needs over the next months and aids in anticipating liquidity deficits. Structural liquidity analysis looks at the structural imbalance in the maturity pattern of assets and liabilities that has a high potential for liquidity risk. To manage liquidity, banks should use both the stock strategy and the cash flow approach. In order to ensure that sufficient stocks of liquidity exist within the organization in various forms, the stock approach mandates that banks adhere to prudent ratios between specific critical components of assets and liabilities, whereas the cash flow approach calls for them to determine the net shortfall in liquidity in various time buckets and come up with solutions to address liquidity shortages.

The framework for managing liquidity should include processes for evaluating the liquidity situation in normal, bank-specific, and market crisis scenarios, as well as recommendations for methods to close liquidity gaps. Regular stress tests of the liquidity funding risk should be conducted with consideration for the risk variables found in the bank's own liquidity profile. To avoid the establishment of structural imbalance in the asset-liability maturity pattern, the liquidity monitoring team should recognize signs of liquidity risk and recommend corrective action.

Management of Interest Rate Risk

The danger of losing a bank's present and future income from its trading and banking book assets, as well as the risk of those assets losing value owing to changes in interest rates, are referred to as interest rate risks. It refers to how sensitive a bank is to changes in interest rates in relation to its existing asset-liability situation. Interest rate risk results in a decrease in asset values as well as an increase in interest payments or a

simultaneous rise in both. The risk associated with anticipated changes in interest rates is not really a concern since known risks may be hedged beforehand or goods can be priced correctly by including the risk component. The imperfect competition that typically rules the financial market or the asymmetries in interest rate variations on various financial instruments that exist across domestic and international financial markets, however, also contribute to interest rate risk when expected movements of interest rates occur. The underlying value of a bank's assets, liabilities, and off-balance-sheet instruments are all impacted by interest rate changes, which also have an impact on the bank's net interest income. Changes in interest rates have an immediate influence on profits, and a longer-term effect on the market value of stock or net worth. The economic cycle and other hazards are related to interest rate risk, which is not a risk that exists independently.

Both the banking book and the trading book are subject to interest rate risk. The banking book consists of assets that are derived from contractual relationships with clients and are held until maturity for generating steady income. The trading book consists of assets that are held by a bank for booking profits through purchase and sale by taking advantage of short-term movements in prices or yields. The trading book often holds assets including securities, shares, commodities, foreign currencies, and derivatives that are subject to mark-to-market value. Banks must make preparations out of their existing income in the event that asset prices drop, which lowers profit. While banks are free to choose how their trade and banking books are composed, they are not allowed to do so capriciously or arbitrarily. The majority of bank regulators demand that bank management develop guidelines and standards for the inclusion of assets in the trading book and abide by those guidelines throughout the financial year. The supervisory directive on advance disclosure of norms is meant to protect the assurance that the bank's balance sheet reflects a genuine statement of affairs while also ensuring conformity with accepted accounting principles.

A trading book is defined as "positions in financial instruments and commodities held either with the intention of trading or in order to hedge other elements of the trading book" by the Basel Committee on Banking Supervision. The financial instruments must either be entirely hedgeable or devoid of any restrictions on their ability to be traded. Both main

financial instruments and derivative financial products are referred to as financial instruments. Positions held with trading intent are those held with the intent to profit from actual or anticipated short-term price movements or to lock in arbitrage profits. Examples include proprietary positions, positions resulting from client servicing, and positions arising from market making.

Causes of Interest Rate Risk

The gap or mismatch between assets, liabilities, and off-balance-sheet things that have different principal amounts, various maturity dates, and distinct repricing dates is the main cause of interest rate risk. The following are the elements that cause interest rate risk:

1. Risk of mismatch.
2. Yield curve danger.
3. Baseline risk.
4. Risk of an embedded option.
5. Risk of reinvestment.
6. Position risk for net interest.

In the section that follows, these factors of interest rate risk are briefly described.

Matching Risk

The risk associated with maturity mismatches of a bank's assets, liabilities, and off-balance-sheet position, as well as the resulting variations in when these things are repriced, is known as mismatch risk. In a one-to-one transaction, mismatch risk arises when the tenures of an asset and a liability do not coincide or when the principle amounts of the two are not equal. The bank can maintain the required interest spread and prevent interest rate risk if every asset can be supported by a liability with an equivalent duration. However, it is hard to match the tenure of each asset with that of a liability in the day-to-day operations of a bank, which serves as a financial mediator between lenders and borrowers of money. As a result, mismatches between assets and liabilities always manifest and cause repricing risk, which in turn causes interest rate risk. Since the interest rate is heavily impacted by market trends, the risk results from the bank's incapacity to reprioritize the assets or obligations upon maturity in a way that safeguards the interest spread.

If a time deposit with a six-month maturity is used to finance a three-year fixed-rate loan, the interest spread will narrow if the bank is required to renew the time deposit at higher rates every six months to stay up with the market trend. After the first six months, even if the bank discovers a different source of funding, the carrying cost could not coincide. Due to the constant

cash inflows from the loan during its three-year maturity term and the variable cash outflows from interest paid on the six-month time deposit, the interest income has decreased. In the same way, if a bank uses a three-year fixed-rate time deposit to finance a one-year loan, the bank may not be able to sustain the interest spread if the lending rate drops after the first year since the second loan would need to be made at a lower rate. In this instance, the liability's cash outflows are set for three years, but the asset's cash inflows are variable. Interest rate risk is caused by the repricing of assets and obligations at various periods in time [5]–[7].

A bank is not always protected against mismatch risk by an interest rate management approach based on variable rates for both deposits and loans. The central bank intervenes by revising monetary policy, which may include reducing liquidity in the financial sector, when inflation rates increase in a country or the value of the native currency falls precipitously versus other currencies. In order to attract new deposits and stop maturing deposits from leaving the bank when liquidity is tight, banks hike interest rates on time deposits. This increases the average cost of money. They are prohibited from unilaterally raising their lending rates for current clients until the loans are up for renewal or a breach of the covenant gives rise to a claim. It may not be possible to increase the lending rate at the required point in time, disregarding market sentiments and the lending rate structure of peer banks, where the lending rate is linked to the prime lending rate and the loan documents grant the bank the right to revise lending rates following revision of the prime lending rate. Additionally, even in cases when loan agreements allow banks to adjust the lending rate to an existing client at their discretion, they hold off doing so out of concern that they would lose a crucial customer. Therefore, even under a flexible interest rate regime, discrepancies in the timing of repricing obligations and assets result in interest rate risk and decrease net interest income, at least during the interim period before adjustments may take effect. Therefore, mismatch risk cannot be avoided in banking.

Risk of Yield Curve

The unforeseen change in the yield curve's shape and slope, which has an impact on the financial instruments' economic value, is what causes yield curve risk. Rarely does the yield curve travel parallel to itself. Yield curve risk is caused by the uneven fluctuations in yields on similar kinds of financial assets with varying maturities. The value of assets, and

notably the value of fixed-income instruments, is harmed by a negative shift in the yield curve. The price of a financial instrument that a bank purchased at a cost that was based on the yield in effect at the time of acquisition varies when the yield curve adjusts. The fluctuation in the yield curve's form will determine how much of an effect there is. The yield spreads between short-term and long-term interest rates widen when the yield curve steepens, which causes the prices of long-term financial instruments to depreciate more quickly than short-term ones. The yield spreads between short-term and long-term interest rates narrow when the yield curve flattens, which has the effect of making instrument value fluctuations less noticeable.

Base Risk

The danger of losing money owing to a negative shift in the earnings spread brought on by an uneven degree of change in the reference rates that serve as the foundation for pricing assets and liabilities is referred to as basis risk. In a particular period of time, interest rates on different financial instruments do not fluctuate to the same extent; instead, they do so in varying magnitudes. Even if the asset and liability maturity periods are the same and their repricing occurs at the same time, basis risk will still exist. If a loan's interest rate was set using the London Interbank Offered Rate and the interest rate on the debt used to fund it was set using the rate on a Treasury note issued by the U.S. government with the same maturity, and at the time of repricing, the amount of the LIBOR and the U.S. rate on Treasury notes was different. If both LIBOR and the U.S. grow, the bank's interest margin will also rise. The Treasury note rate will benefit from a positive basis risk if it stays the same or falls at the time of repricing. In the alternative case, the bank would have a negative basis risk and the interest margin would decrease.

Risk of Embedded Option

The danger of losing interest income as a result of options being exercised by clients, fund providers, or swap option holders is known as embedded option risk. The cash flows on the financial instrument or the financial contract are changed when an option holder exercises their right to do so. Customers of a bank have the option of taking money out of non-fixed-term deposit accounts at any time, taking money out of time deposits before they mature, or paying off fixed-rate loans early if market lending rates fall. Similarly, if the coupon rate on bonds with a comparable grade and maturity decreases in the financial market, the issuer

of bonds held by a bank may exercise an option to purchase them back. Due to counterparties exercising their options in either scenario, the bank's revenue decreases. Either directly or implicitly, the options are included into the instruments, agreements, or asset-liability transactions. Due to the potential for more extensive usage of options against banks, embedded option risks significantly rise in a system with variable interest rates. Prepayment of loans rises when interest rates fall whereas premature withdrawals from time deposits rise when rates rise. Interest rate risk from embedded options is now a reality and may sometimes be large due to the wide variety and rising complexity of financial instruments and derivative products [8]–[10].

Risk of Reinvestment

Mismatch and repricing concerns have a byproduct called reinvestment risk. Banks sometimes struggle to reinvest aging cash flows at the current rate or at appropriate spreads due to a lack of investment possibilities. The bank's net interest income will decrease, assuming that the cost of funds has stayed constant, if reinvestment of cash inflows from matured assets occurs at a rate that is lower than the rate at which the investment was made originally. Reinvestment risk is the possibility of losing money due to the diminishing interest spread on reinvestment choices.

Risk in Net Interest Position

Banks keep a significant amount of float funds, or interest-free money, which are liabilities that do not pay interest, in the normal course of business. The following are some examples of funds that do not pay interest: funds received from customers for the issuance of drafts or electronic transfers that are held until the actual payment is made at another location; down payments or cash margins received from customers as collateral against loans; funds issued for the purpose of providing financial guarantees or letters of credit until the transactions are closed; and funds received on behalf of the government toward the collection of taxes and duties as agents until the funds are cred These float funds vary in size and typical holding term from bank to bank, but in general, they are extremely sizable. A significant percentage of core float funds often remain in the operations of the bank despite the constant inflows and outflows of money throughout every working hour. If a bank has more assets that generate income than obligations that must be paid, its net interest position is positive. In such a scenario, the bank's net interest income changes

according to the market interest rate, declining when it declines and rising when it rises. If the bank's net interest position is negative, the income is reversed. A bank is less vulnerable to fluctuations in interest rates if it has a high quantity of core noninterest-paying float funds.

Risk measurement for Interest Rates

Techniques for measuring interest rate risk aim to determine how sensitive the balance sheet of a bank is to changes in interest rates. The goal is to quantify the amount of interest rate risk that the balance sheet already carries. The economic activity, business mix, and asset and liability composition differ amongst banks, sometimes very noticeably, and as a result, the effect will also differ. Changes in the interest rate have an immediate effect on the trading book and a delayed effect on the banking book. When the market interest rate changes, a bank must take some time to adjust the interest rates on loans and deposits, but the effect is immediate for assets in the trading book. A bank that heavily relies on big, wholesale deposits or borrowings to finance its investments will be more sensitive to fluctuations in interest rates than a bank that primarily relies on retail deposits to fund its loan portfolio. As a result, the choice of interest rate risk measuring technique and strategy will depend on a bank's operations, business mix, and asset-liability composition.

The risk from each source that contributes to interest rate risk is taken into account by the interest rate measurement models, but it is challenging to set up models that consider each source separately at the same time because there is no reliable and empirically established data on correlation between the mismatch risk, basis risk, yield curve risk, and embedded option risk. It becomes important to formulate distinct hypotheses with regard to each source of interest rate risk and to evaluate the effect on the balance sheet independently. However, the measurement system should recognize and record all significant sources of interest rate risk arising from the present and projected operations of a bank and evaluate its susceptibility to challenging and unpredictable circumstances.

Perspective on Interest Rate Risk Measurement

Banks should evaluate interest rate risk from two angles: from the standpoint of profitability and from the perspective of the economic worth of equity. They should develop a system to determine how interest rate changes will affect short-term earnings since declining profits hurt profitability and hinder the accrual of retained earnings that support capital expansion.

Because profits analysis is a key factor in determining a bank's viability, the method for measuring earnings loss due to interest rate fluctuations has significant relevance. The effect of interest rate movement on the balance sheet and net worth should be assessed, and processes should be established by banks to determine interest rate sensitivity from the perspective of economic value. The economic value is determined by applying a discount factor that corresponds to the market-driven interest rate to the net cash flows on all assets, liabilities, and off-balance-sheet positions. Although both techniques are helpful, the economic value approach is more thorough than the earnings approach since it considers the present value of all future cash flows. The economic value method examines the influence on the bank's net worth and the stability of its operations in the long run, while the earnings approach measures the impact on the bank's profit in the near term. In order to assess the trajectory of their profits and the appearance of any destabilizing factor that might compromise financial soundness, banks should employ both measurements concurrently.

The balance sheet must be divided into the banking book and the trading book in order to calculate interest rate risk sensitivity. The banking book is more concerned with profitability and economic value risk than the trading book is with price risk. The interest rate risk is analyzed from several angles by each measuring approach. In order to assess the total effect of interest rate risk on the financial position, banks often use all four methodologies, both alone and in combination.

Maturity Gap Examination

The simplest analytical method for determining how much a bank's assets and liabilities are affected by interest rate changes and how repricing mismatches affect the bank's profitability is maturity gap analysis. In the banking book, banks first identify all interest rate-sensitive assets, liabilities, and off-balance-sheet entities before classifying them into pre-set time buckets based on the length of time until maturity or the repricing period, whichever comes first. A statement of interest rate-sensitive assets, liabilities, and repricing gaps resulting from maturity mismatches are produced as a result of this procedure. Certain assets and liabilities have specified repricing intervals, whilst others don't. For instance, when the contractual maturity time has passed, fixed-rate assets and liabilities have specified repricing intervals, but floating-rate assets and liabilities do not. In order to

assign time buckets to assets and liabilities where actual/behavioral maturities vary, banks must conduct historical studies of behavioral maturity/repricing profiles as well as use their judgment and experience. These items include the interest-bearing portion of demand deposits and some other items, such as time deposits, loans, revolving retail credits, embedded options with put/call riders, and so forth. the variation in the amount of rate-sensitive assets and liabilities, the gap in each time bucket, and the overall gap up to the chosen time zone, for example, the gap up to the previous year. The magnitude of an asset's and liability's interest rate sensitivity within a certain time bucket is indicated by the amount of the gap inside that bucket. The bank is more susceptible to fluctuations in interest rates the wider the cumulative disparity. The bank is in a liability-sensitive situation if the interest rate sensitivity statement for a particular date shows that the liabilities are repricing quicker than the assets. On the other hand, the bank is in an asset-sensitive situation if the statement shows that its assets are appreciating more quickly than its liabilities. If the interest rate increases in the first scenario, the outflows will grow because the deposits will be revalued before the loans, but in the second scenario, the inflows would increase because the assets will be revalued before the deposits. Which assets and liabilities are revalued depends on how long it takes to calculate the effect of changing interest rates. Because new assets and liabilities may be recorded at new rates, interest rate changes have a far less effect over the long term than they do in the near term.

To sum up, banks must carry out the following tasks in order to implement the maturity gap analysis approach to assess the sensitivity of interest rate risk in the banking book:

1. The balance statement should be divided into the trade book and the banking book, with the things that should be included in each category specified.
2. To define, identify, and group into the proper time periods all rate-sensitive assets, liabilities, and off-balance-sheet entities.
3. To allot time buckets to assets and liabilities that don't have defined repricing intervals.
4. To provide those assets and liabilities time buckets when actual/behavioral maturities differ from contractual maturities.
5. To define standards for dividing retail demand deposits into segments that pay interest and those that don't.

6. Create a model for profits at risk to calculate the probable loss in the banking book due to expected interest rate changes in the future.

The Maturity Gap Analysis's Restrictions

With conventional products and portfolios, small- and medium-sized banks are better suited for the maturity gap analysis approach. Large banks with lots of complicated products and a lot of business want more advanced methods. Because it takes into consideration the present amounts of assets and liabilities and presumes that they won't change, the maturity gap analysis approach is a static metric. When evaluating interest rate sensitivity using the maturity gap analysis technique, banks should first determine whether a static measure is actually appropriate. If not, they should create short-term dynamic interest rate sensitivity statements that take into account the anticipated changes in the volume of assets and liabilities.

The maturity gap analysis approach has certain drawbacks. It is predicated on the idea that every asset and liability will reach maturity and be revalued simultaneously. Additionally, it ignores the basis risk even though the prices of assets and liabilities are often tied to separate indices and assumes a simultaneous change in the yield curve, which seldom ever occurs. The asset price could be related to the United States. The price of the liabilities and the Treasury bill rate may both be dependent on LIBOR. Additionally, the inherent options risk is ignored in the maturity gap analysis, despite the fact that in reality, customers use their options to withdraw money from time deposits early and pay off their term loans early when interest rates shift in their favor. Finally, it does not account for changes in interest rates that affect the market value of stock held by the bank. Even big banks may benefit from maturity gap analysis in order to get a general sense of how interest rate sensitive their balance sheets are and to take prompt corrective action to reduce risk.

Analysis of the Duration Gap

Another method to assess a bank's susceptibility to interest rate risk is duration gap analysis. Duration quantifies the percentage change in an investment's economic value that corresponds to a change in interest rate. Given the coupon due on the bond, the current market yield, and the bond's maturity time, it is the amount of change in a bond's value that results from a change in the market interest rate. The price sensitivity of financial instruments to changes in interest rates is estimated using duration analysis.

Duration is the amount of time it takes for a security's internal cash flows to pay back an investment. The coupon rate and current yield of a financial instrument are the main factors that influence its duration. Due to the coupon payments made before to maturity, duration is shorter for instruments with larger coupons, and vice versa. As a result, duration is lower than maturity when payments are made in installments prior to maturity and equal to maturity for financial instruments with zero coupon rates. The price volatility of a financial instrument in response to changes in interest rates increases with the tenure of the instrument. Finally, the approach enables us to calculate the change in equity's economic value as a result of interest rate fluctuations.

Duration of Macaulay and Modified Duration

To protect the bank's balance sheet from negative interest rate changes, it is important to understand the sensitivity of each asset and liability to interest rates over their respective time horizons, estimate how much an item's value will change in response to a given change in interest rates, and assess the sensitivity of the market value of equity. Based on the notions of modified duration and Macaulay's duration, which are presented in the next section, banks should do duration analysis.

Macaulay's Time Frame

The idea of duration was initially introduced by Frederick Macaulay in 1938; as a result, the duration in its simplest version, which is measured in years, is known as Macaulay's duration. When the instrument's current interest rate or yield to maturity changes, the duration is adjusted.

The Macaulay's duration, which accounts for the present values of the coupons and the principal received till maturity, is the length of time needed to recoup the cost of a financial instrument. First, the present value of each cash flow due on the financial instrument is multiplied by the time it is received. Next, the present values of the cash flows are added, and the total present value is then divided by the instrument's current price. By comparing the price volatility of the instrument to changes in interest rates, Macaulay's duration calculates the instrument's volatility. Macaulay's duration is calculated using the following formula: where CF is cash flow at time t, t is the time period in which coupon and principal are paid, n is the number of periods until maturity during which payment is made, and i is the yield to maturity.

Consequences of the Duration Gap

The duration gap approach calculates the percentage change in a bank's equity's market value in response to an interest rate change. Longer duration financial instruments are riskier than shorter duration ones, and the wider the duration difference, the more susceptible the bank's net value is to fluctuations in interest rates. The market value of equity in a bank decrease as interest rates rise and rises when interest rates fall if the weighted average duration of assets exceeds the weighted average duration of liabilities. The market value of equity grows with a rise in interest rates and declines with a decline in interest rates in the opposite scenario, where the weighted average duration of obligations exceeds the weighted average duration of assets. If the duration gap is zero, the market value of the share won't change. The market value of equities is more susceptible to fluctuations in interest rates the larger the duration difference, whether positive or negative [11]–[13].

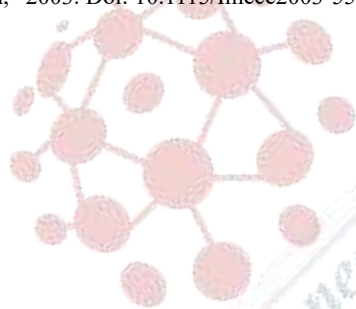
CONCLUSION

In conclusion, Effective risk management depends heavily on the appropriateness of tolerance boundaries. Organizations may set suitable tolerance limits by taking into account elements including risk appetite, legal requirements, industry standards, risk profile, risk management skills, and the harmony between risk and reward. These guidelines guarantee that risks are handled within reasonable bounds, promoting informed decision-making and the accomplishment of business goals while maintaining a responsible risk posture. Tolerance limits must be reviewed and adjusted on a regular basis to account for shifting risk environments and changing business requirements.

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A Brief Discussion on Management of the Duration Gap

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ABSTRACT: *The management of the duration gap is a critical aspect of interest rate risk management for financial institutions. This abstract provides an overview of the duration gap, its significance, measurement methods, and the strategies employed to manage it effectively. The duration gap represents the difference between the weighted average duration of a financial institution's assets and liabilities. Duration measures the sensitivity of the value of fixed-income securities to changes in interest rates. By analyzing the duration gap, institutions can assess their exposure to interest rate risk and develop strategies to mitigate potential losses.*

KEYWORDS: *Asset-Liability Management, Duration Gap Analysis, Duration Matching, Duration Risk, Gap Management, Interest Rate Risk, Liability-Driven Investing (LDI).*

INTRODUCTION

A financial institution's soundness is determined using the "going concern concept," and its solvency is determined by the institution's capacity to pay off all of its existing and future obligations in full as and when they become due. The financial institution is required to make sure that at all times, the market value of its assets is greater than the market value of its liabilities. A effective strategy to reduce the effect of fluctuating interest rates on a bank's financial condition is duration matching. A bank's net worth is determined by deducting the market value of its liabilities from the market value of its assets. If there is an imbalance in the duration of assets and liabilities, a bank is more susceptible to interest rate risk. The bank may protect its net worth from fluctuations in interest rates by aligning the weighted average duration of assets with the weighted average duration of liabilities. Achieving such a flawless scenario, however, is impossible owing to market flaws. The objective is to minimize the weighted average time gap and maximize its proximity to zero [1]–[3].

The bank will need to modify the duration of assets and liabilities in order to reduce the weighted average duration difference to zero. If the average asset duration is higher, the bank should gradually decrease it to narrow the duration gap as much as feasible or lengthen the duration of liabilities to get it closer to the average asset duration. Due to restricted alternatives and unfavorable market conditions, it is hard to match the duration of assets and liabilities in real-world situations. A bank may pick the maturity mix of its

assets to a significant degree, but it has less influence over the length of liabilities than it has over assets since depositors and fund providers establish the conditions for holding money with the bank.

If the interest rate increases and the duration difference is zero, the changes in the market prices of the assets and liabilities will cancel each other out and the net worth will stay constant. Since a structure of assets and liabilities that results in a duration gap equal to zero is essentially unachievable, the interest rate risk must be reduced by either decreasing the positive or negative duration gap by changing the maturities of assets and liabilities over time or by increasing the proportion of floating rate assets and liabilities. Derivative instruments including forward rate agreements, interest rate swaps, options, and futures may also be used to hedge the risk.

It is preferable to aim for shorter durations for both assets and liabilities when interest rates are fluctuating or when they are high but still within acceptable bounds. A sensitivity analysis of the bank's market value of equity should be conducted under various interest rate scenarios. If the interest rate increases by 100 or 200 basis points, it should determine how much the duration of assets and obligations will change and what effect it will have on the economic value of equity. The bank should conduct an analysis of the present interest rate environment, predict the direction and level of future interest rates, and gradually change the structure and maturity profile of assets and liabilities. In order to reduce the negative effects of interest rate changes on the market value of stock, the bank should work for a narrower term gap. In order to

successfully protect against interest rate shocks, assets and liabilities must sometimes have their durations reset since financial instruments' durations alter over time. Banks should also consider the convexity factor to protect their net value from significant changes in interest rates.

DISCUSSION

Simulation Analysis

The sensitivity of a bank's balance sheet to various interest rate scenarios may be assessed through simulation analysis, which can also be used to calculate the impact on the bank's net income and market value of stock. A simulation exercise is conducted in relation to potential future interest rate paths, yield curve shapes, adjustments to business or financing plans, product pricing and hedging methods, etc. Due to its high level of technicality and skill emphasis, simulation analysis is much more difficult than maturity gap and duration gap analysis. The validity of the hypotheses and the dependability of the data play a significant role in how reliable the simulation exercise's results are; if any of these two criteria is skewed, the results will be inaccurate. However, the simulation approach is adaptable since the simulation's output may be tailored to the user's requirements [4]–[6].

In accordance with the two fundamental goals of determining the influence on profits and economic value of equity, two kinds of simulation analysis must be performed in order to assess the bank's balance sheet's interest rate sensitivity. The first kind is a study of income based on a simulation, which shows how changes in interest income or net income relate to changes in interest rates. If the data and assumptions used in the model are representative and realistic, the income simulation exercise is a more accurate way to gauge the effect of interest rate risk than the maturity gap analysis and duration gap analysis methodologies. The "base case" scenario and the time horizon for calculating the effect of interest rate changes are the two main inputs for the income simulation study. The current balance sheet position on a "as is, where is" basis or the reconstructed position, after taking into account the expected changes in the composition of assets and liabilities and/or business activities over the selected time zone, can be used as the base case scenario with which the comparison of the simulation outputs under alternative scenarios is made. If a bank has a lot of long-term assets supported by short-term obligations, the time horizon should be longer due to

the higher maturity mismatch risk. It is typical to conduct simulation analysis based on a one-year time horizon to measure fluctuations in revenue.

The second kind of simulation study uses accurate data on the market prices of traded instruments to track changes in stock market value under various interest rate scenarios. When discounting the cash flows of assets, liabilities, and off-balance-sheet items, it is important to consider changes in net worth or equity market value as well as various projected interest rates as discount factors. The analysis's findings should then be contrasted with the best-case scenario in order to draw conclusions. Only if the assumptions are reasonable and their validity is checked will the conclusion be trustworthy. For major financial institutions that have high interest rate exposures, the simulation analysis is especially important.

Value-At-Risk

Value-at-risk is a technique that banks often use to calculate the potential loss from investment portfolios, foreign currency portfolios, and commodity portfolios, including gold, under conditions of typical market volatility and risk factors. In order to evaluate the depreciation of assets, the sufficiency of capital maintained to cover market risk, and the effect on the market value of equity, banks must compute the VaRs on various portfolios at regular intervals. The next section discusses the VaR calculation idea and technique.

The Value-At-Risk Idea

VaR, which is calculated with reference to preset time zones and predetermined levels of confidence, is the potential loss that might affect an asset, a portfolio, or a position as a result of the unfavorable movement in certain market risk factors. An investment project, a trading position, a portfolio of assets, or a single financial instrument's potential loss may all be estimated using VaR as a risk assessment tool. The real loss that might ultimately occur may vary from the prospective loss calculated using the VaR technique. In order to assess the validity of the model and the dependability of the data used in the model, the actual loss on the financial instruments or the trading position that has already happened in the past is compared with the predicted VaR. The volatility of asset prices, the length of time over which the risk is to be evaluated, and the degree of confidence assumed serve as the inputs for the computation of VaR. A day, a week, a fortnight, a month, or even a year might be used as the time frame for estimating the VaR. For the purpose of calculating VaR, the New Basel Capital Accord

specifies a minimum holding time of 10 trading days. Even on a same set of financial instruments or trading position, the latter will alter if the portfolio's time horizon, anticipated degree of certainty, or level of confidence varies. The potential loss on a portfolio or a position won't surpass a particular amount under typical market circumstances, we may declare with varied degrees of confidence thanks to the VaR model.

Knowing the Asset Value Volatility

The key input for the calculation of VaR is volatility, which is a statistical term that describes the historical dispersion of an asset's values from its average over a certain time period. Volatility measures how quickly prices for securities, stocks, options, and other financial instruments changed throughout the given time period, as well as how much returns on bond investments fluctuated. It may also measure changes in stock market or commodities market indexes. It is determined as the standard deviation of the percentage deviations in asset prices over a certain time period from their average. It measures the difference from the starting point as well as the speed at which the values of the selected variable have increased and decreased in the past. A security that is highly volatile is likely to see significant swings in value quickly. A reduced volatility indicates that future price fluctuations for the security are anticipated to be relatively mild. We may compute the standard deviation or historical volatility using time series data on the values of variables such as stock price, gold price, interest rate, exchange rate, and so on. Using the square root approach, we can get 1-day, 10-day, monthly, and so forth volatility from the yearly volatility. For instance, daily volatility is calculated by dividing yearly volatility by, assuming a year has 250 trading days.

The Confidence Level to Use

Knowing the possible loss that might result from the assets that make up the investment portfolio or from the trading position is essential for controlling market risk. Not only do we need to know whether or not asset or position values will decline, but also how much they could decline or how confidently we can predict that they won't decline by a certain amount. To determine the potential losses on financial instruments or trading positions under various levels of confidence for various holding periods, we must follow the relationship between the standard deviation of the fluctuations in an asset's value and the confidence level.

Choosing The Time Frame

VaR is calculated based on the selected holding times, which might be 1 day, 10 days, 1 month, or 1 year. The holding time will be chosen based on the kind of exposure or the specifics of the transaction. While VaR on investments in sovereign securities or stocks is often computed with reference to a holding term of 10 days, a fortnight, or one month, VaR on open foreign currency positions is typically calculated at the end of each day, i.e., a holding period of one day. The holding period's duration is determined by regulatory requirements, accepted accounting principles, and the bank's tolerance for risk.

Depending on the degree of confidence selected, the amount of probable loss determined by using the VaR approach will change. The VaR, or the amount of possible loss, will be greater with higher levels of confidence, and the capital needed to cover market risk will also be higher. The benchmark that a bank chooses to use will rely on its risk management philosophies and risk-bearing capabilities. A bank that prefers to pursue a highly cautious strategy may estimate VaR based on a high degree of confidence, which is 99.9 percent, while a bank that aims to adopt a liberal approach may base its calculations on a moderate level of confidence, or 95 percent. The range of the practice, or 1.65 to 3 times the standard deviation, varies amongst banks and is between 95% and 99.9%. Again, depending on the holding time selected, VaR will change. The VaR will increase with a longer holding duration, indicating a greater amount of potential loss. VaR is computed independently for various financial instrument types and exposure types. It is individually computed for, as an illustration:

1. Fixed-income investments.
2. Equity status.
3. Exchange rate situation.

VaR can be calculated using a number of techniques, including the variance-covariance method, historical simulation method, and Monte Carlo simulation method. However, using the current price and the percentage of volatility in instrument prices or position values recorded over the last few years, banks may calculate VaR on a specific financial instrument or trading position in a more straightforward manner. In order to create acceptable standards for managing market risk, a risk-sensitive bank should compute VaR with regard to various holding durations and various confidence levels on various kinds of financial instruments and positions.

The VaR Model's Usefulness

VaR is a practical method for controlling market risk. It is the most the bank may lose under normal conditions given the asset's present value, the holding time, the confidence level, and the volatility %. In order to evaluate the potential effects of market risk, banks compute VaR for each instrument, the investment portfolio, and the trading position on both on- and off-balance-sheet goods. then use the VaR approach to produce balance sheet values that take into account various market risk indicators, and then utilize the simulated balance sheet values to gauge the decline in equity value caused by negative changes in market risk variables. To prevent a violation of the capital adequacy ratio, the fall in equity value must be compared to the existing equity and a sufficient level of equity must be maintained. Banks set an overall VaR limit, or the maximum equity value at risk, for the management of interest rate risk and take corrective action when VaR exceeds that level under plausible assumptions.

VaR must be back-tested by comparing the generated potential loss data with the relevant period's actual loss data. If there are significant differences between the calculated losses and actual losses, the technique and the underlying assumptions should be adjusted. The output of the VaR model must closely resemble the genuine events that sometimes occur. VaR is a sophisticated technique for measuring risk that aids in managing market risk in the trading portfolio and determining the right business mix, but it does not take the place of other checks and controls that must be followed to manage market risk.

Problems with the VaR Approach

The VaR technique has certain restrictions and disadvantages. It employs historical data or generated data, which may not be realistic or may only have a limited amount of validity, and makes certain assumptions in doing so. A good approximation for predicting the future behavior of market variables may not be provided by the volatilities and correlations derived from historical data, or the assumption of normal distribution of data, such as price or yield fluctuation data, for the computation of the standard deviation. The VaR approach focuses on the estimation of losses for specified time horizons, which are typically very short—1 day, 10 days, or 1 month—and where the time horizon is long, the estimates are likely to be biased. Furthermore, VaR estimates are based on the end-of-day positions and do not typically take into account the intraday trading risk. Although commonly

utilized by financial organizations, the VaR approach is a useful tool for assessing market risk in a bank's day-to-day operations.

Profits at Risk

profits come from a variety of sources, but in this case we focus only on the loss of profits due to an unfavorable change in interest rates. Earnings at risk is a term used to describe the potential erosion of a bank's net interest revenue as a result of fluctuations in interest rates. EaR is calculated in accordance with a chosen time zone, which may be a quarter, half, or whole year. In order to compute EaR, banks first determine the gaps between rate-sensitive assets and liabilities in various time buckets, and then multiply the positive or negative gaps by the anticipated changes in interest rates. They choose a time zone for EaR computation that is suitable for the size of the balance sheet and the distribution of its assets and liabilities by maturity. A bank may need to compute EaR at longer intervals if it has significantly longer-term assets and liabilities than it does if it has a substantial quantity of short-term assets and liabilities. It is sufficient to choose a one-year time zone for the calculation of EaR because the typical accounting period is up to one year, it is challenging to predict the interest rate scenario beyond one year, and the change in earnings occurring within the accounting year is more significant. A bank should consider the receipts and payments resulting from the amounts of assets and liabilities that reprice during the next quarter if it wants to determine the impact of a change in interest rates on its net interest income during the following quarter compared to the current quarter. The bank should include the assets and liabilities that underwent a revaluation over that time period when determining how sensitive interest revenue is to changes in interest rates. The maturity gap, mismatch gap, or repricing gap will be the difference between the rate-sensitive assets and liabilities up to the chosen time zone, on which the change in net interest income should be computed.

Amount of Earnings at Risk Estimated

The financial market's liquidity situation, broad price changes, the government's fiscal and monetary policies, exchange rate movements, changes in domestic and global financial markets, and household asset-holding preferences are the key variables that affect interest rates. It is difficult to forecast whether interest rates will increase, decrease, or stay the same in the near future, and if so, by what percentage point. The bank's economists are responsible for conducting

a comprehensive analysis of the financial and economic situation and mapping out potential changes in interest rates for the short- and medium-term. Taking a position on interest rate movement is not guesswork because it is possible to predict with some degree of confidence both the direction and the likely change in level, with the exception of times when it is anticipated that an economic slowdown will likely occur or that market volatility will increase. We generate an opinion on the future interest rate scenario based on the direction and magnitude of interest rate movements in the past as well as other economic variables that affect interest rates. The historical interest rate standard deviation represents the potential range of interest rate volatility [7]–[9].

The standard deviation of interest rate movements should be calculated, historical data on recent interest rate changes should be gathered, and based on the current interest rate scenario and the standard deviation, banks should estimate the likely change in rate that could occur over the course of the next few months or a year. If there is a good cause for it, they may make a judgment call to change the predicted rate. The amount of profits at risk may be determined from the interest rate sensitive asset-liability statements in sections 18.3 and 18.4 using the necessary assumptions after the bank has formed an opinion on the direction of interest rate movement and estimated the expected percentage change in the rate.

Management of Interest Rate Risks

In its updated version, which was issued in July 2004 and contains the guidelines for managing interest rate risk, the Basel Committee on Banking Supervision. The Basel Committee said that "good interest rate risk management entails the use of four fundamental aspects in the management of assets, liabilities, and off-balance sheet instruments:

- a. The proper board and senior management's supervision;
- b. Adequate policies and practices for risk management;
- c. Functions for appropriate risk measuring, monitoring, and control; and
- d. Internal audits that are thorough and impartial.

In accordance with these guiding principles, banks must establish proper day-to-day and long-term policies and processes for managing interest rate risk, as well as maintain distinct lines of authority and responsibility for managing and controlling the risk. For controlling interest rate risk, a bank should have at a minimum the following arrangements:

- a. "Adequate restrictions on taking risks;
- b. Adequate risk measurement methods and criteria;
- c. Standards for judging performance and valuing positions;
- d. Thorough reporting of interest rate risk and evaluation of interest rate risk; and
- e. Dependable internal controls
- f. A bank must essentially concentrate on four important sources of interest rate risk:

Financial Risk

Mismatch in maturities and price risk. Risk associated with term structures.

Risk of An Embedded Option

The strategies for managing interest rate risk must take into account the balance sheet's current structure as well as any anticipated future changes, the pricing policy for products, the boundaries that the bank is required to operate within, the off-balance sheet activities, and the capital allocation for interest rate risk. Under different interest rate scenarios, banks should set tolerance limits for interest rate risk based on the highest profits loss and the minimum market value of equity. Banks should regularly analyze profits at risk under reasonable assumptions about the likely behavior of interest rates in the near future and take proactive actions in advance to reduce the negative impact of interest rate changes on earnings.

Banks should maintain a suitable management information system to create asset-liability statements that are sensitive to interest rate risk on a quarterly basis, or even more often if the interest rate is fluctuating. They should determine the profits at risk on a quarterly basis in light of the expected changes in interest rates and start the necessary corrective actions. If a bank is vulnerable to liabilities, it should gradually restructure its asset portfolio by purchasing assets with flexible interest rates and the right term. For instance, it should progressively decrease fixed-rate medium- and long-term loans while increasing the amount of short-term loans with floating rates. It could also join into forward rate agreements to protect against unfavorable interest rate movements or enter into interest rate swaps if credit spreads are growing smaller.

Banks should pay close attention to the yield structure on assets with various maturities, determine if there will likely be a change in yield, and reorganize their investment portfolio in line with the expected course of events. The yield to maturity and the value of a security have an inverse connection, and changes in

the yield-to-maturity determine the volatility in investment values, or whether they will appreciate or depreciate. Given that volatility depends on both the maturity duration and the coupon rate, the risk of investment value erosion increases when the maturity period or coupon rate decreases. The bank should thus maintain a balanced investment portfolio that includes a good mix of securities with a range of coupon rates and maturities. The bank must regularly monitor the counterparty's financial situation and changes in the market interest rate in order to offload the investment before the counterparty's financial situation worsens or the market interest rate hardens, even in cases where the bank does not have direct credit exposure to a counterparty but has a significant investment exposure through subscriptions to bonds, debentures, and stocks.

Under different interest rate scenarios, a bank should calculate both the volatility of profits based on the maturity gap analysis approach and the volatility of equity value based on the duration gap analysis method. When exposures exceed the risk limitations, the bank must take the necessary corrective action and operate within the risk limits set by its board. For the purpose of managing interest rate risk, it should implement both the maturity gap and duration gap analyses and encompass all assets, liabilities, and off-balance-sheet entities. The duration of assets and liabilities should be matched, since this will protect the economic values of assets and liabilities from interest rate risk more effectively than matching the maturities or repricing intervals.

A bank should perform simulation or scenario analysis with reference to various scenarios, such as interest rate changes, failure of a funding source, and customer use of embedded options, and assess the impact under each scenario. The bank should then fix the interest rates to protect earnings and change the structure and volume of assets and liabilities to maintain the equity value. To determine the greatest possible loss that might occur within a certain time horizon at given confidence levels, the bank should compute VaR on trading positions. The bank should then operate its operations within the provided VaR limitations.

Testing for Interest, Income, And Stress

A bank should periodically conduct stress tests on its net interest income and economic value of equity depending on a variety of variables, including changes in market interest rates, pricing for goods and services, and the composition of its balance sheet. When performing stress tests, it should take into

consideration potential changes in the balance sheet position brought on by the sale or securitization of assets, client prepayment of loans and the ensuing reinvestment, and different real-world and fictitious situations. Stress tests should be performed assuming simultaneous changes in many sources of interest rate risks, such as the yield curve risk, basis risk, term structure risk, embedded options risk, and so on.

Stress testing and VaR work together to manage interest rate risk. Stress tests reveal the expected effect of market risk associated with likely occurrences under stress scenarios, while VaR the greatest possible loss connected with the market risk events under normal conditions. When setting limits on investments, trading positions, and off-balance-sheet transactions, the bank should regularly review stress test scenarios to adjust for changes in market risk events, take into account estimated losses that emerge from the tests, and use the results of both the stress tests and VaR to decide how much economic capital to allocate.

Control of Interest Rate Risk

To track and manage interest rate risk, banks should combine policies, methods, and constraints. They should set standards for dividing investments into categories such as those held for trading, those that are for sale, and those that are kept until maturity, and they should adhere to the mark-to-market method of valuing investment and trading portfolios. Banks should maintain a well-diversified investment portfolio and not limit their investment activities to the corporate bond market in order to prevent shocks from abrupt and severe interest rate changes. In order to respond to the changing interest rate environment, they need periodically shuffle the instruments in their portfolio and set the updated duration of the instruments in accordance with the projection for interest rate changes. In accordance with the interest rate sensitivity of the different financial instruments, banks should establish distinct limitations on investments in government securities, public sector unit bonds, private corporate bonds, stocks, and mutual funds.

The following steps should be taken by banks at the very least in order to manage interest rate risk in the trading and banking books:

1. Set limits on the maximum maturities of the assets and liabilities as well as the maximum modified durations of the assets and liabilities.
2. Set a limit on intraday short sales.
3. Establish holding times for various instruments.

4. Set limitations on VaR, stop losses, and the defeasance term.
5. Set restrictions on the notional principle amounts that may be used in a given forward rate agreement or interest rate swap transaction.
6. Establish the financial authority of authorities for money market and investment activities.

Interest rate risk results in lost income in the now and the future as well as diminished asset values. It mostly results from maturity mismatches or gaps in assets, liabilities, and off-balance-sheet situations, which entail various principal amounts and repricing dates. Interest rate risk appears in both trading and banking books and is connected to other forms of risk. The main causes of interest rate risk are maturity mismatch risk, yield curve risk, basis risk, embedded option risk, reinvestment risk, and net interest position risk.

Banks should evaluate the sensitivity of assets and liabilities to interest rates from the perspectives of profitability and economic value. The economic value technique discloses the influence on the net worth whereas the earnings approach analyzes the impact on a bank's short-term profit. There are four ways to calculate interest rate risk: maturity gap analysis, duration gap analysis, simulation analysis, and value-at-risk. To calculate interest rate risk sensitivity, banks should determine the gaps between the amount of rate-sensitive assets and liabilities in different time buckets. The bank is more susceptible to changes in interest rates the wider the disparity.

The presence of maturity gaps reveals the bank's asset- or liability-sensitive situation. A bank with a high sensitivity to liabilities will see a fall in net earnings whereas a bank with a high sensitivity to assets would see an increase. The matching of asset-liability durations used in duration gap analysis allows for the measurement of a bank's interest rate sensitivity. Therefore, banks should work to maintain a narrower duration gap when the interest rate is relatively unsettled in order to lessen the influence of interest rate swings on net worth. The wider the duration gap, the more sensitive is a bank's net worth to interest rate changes.

A technique for assessing a bank's interest rate sensitivity under various interest rate and balance sheet scenarios is simulation analysis. With modifications in the potential interest rate risk events in mind, the simulation exercise is conducted. By using the value-at-risk approach, banks may calculate the potential loss on an asset, a portfolio, or a trading position as a result of the negative movement in market risk factors. VaR on an asset changes

depending on the confidence level and time horizon that are selected. The holding time or the duration of the

By computing earnings at risk on the rate-sensitive net exposure up to a chosen time zone, banks may determine the erosion in net interest income caused by changes in interest rates. Banks should restructure their assets and liabilities to close maturity gaps and protect the balance sheet against interest rate shocks if profits at risk are considerable for small interest rate fluctuations.

To assess the impact on earnings and net worth under various stress scenarios, banks should regularly conduct stress tests of net interest income and economic values of assets and liabilities. Using the results of these tests, along with VaR, banks should set limits on investments, trading positions, and off-balance-sheet transactions, as well as determine the economic capital allocation.

Management of Foreign Exchange Risk

The risk of loss from a bank's exposure to foreign currencies that results from an adverse shift in the exchange rate between domestic and foreign currencies is known as foreign exchange risk. Due to the unpredictability of exchange rate swings, banks' risk sensitivity has dramatically altered. The risk of loss increases with the amount of foreign currency exposure and the amount of exchange rate swings. Exchange rate volatility is mostly influenced by differences in growth and inflation rates as well as interest rates on financial instruments across nations. Other important factors that affect exchange rate movements include the amount of foreign currency reserves and current account deficits, the variations in the fiscal and monetary policy stances of governments and central banks, and the relative differences in the purchasing power of domestic currencies.

By accepting deposits, issuing bonds, borrowing on international financial markets, and obtaining credit lines or term loans from foreign banks and multilateral financial organizations, among other methods, banks are able to generate foreign currency resources. They hold foreign currency assets in a variety of ways, including cash balances at foreign central banks, investments in foreign securities, loans made to domestic and international customers in foreign currencies, and placements of money with other institutions on foreign financial markets. Since the assets, liabilities, and off-balance-sheet positions are all held in various foreign currencies, banks may either lose money or gain money when exchange rates

between different currencies fluctuate. The foreign currency assets, liabilities, and positions may all at any moment be changed into domestic currency at the current exchange rate, with the resulting notional gain or loss. The assets and liabilities of overseas branch offices are converted into local currency at the exchange rate in effect on the account closure day and included in the balance sheet when a consolidated balance sheet is created. The profit and loss account often includes the resulting gain or loss resulting from a change in exchange rates between the transaction booking date and the balance sheet date [8]–[10].

CONCLUSION

In conclusion, for financial institutions, managing the duration gap is an essential part of managing interest rate risk. Institutions may lessen the potential negative consequences of changing interest rates on their portfolios by comprehending, monitoring, and actively managing the duration difference. Institutions may control their interest rate risk exposures and maintain a stable and balanced portfolio by using asset-liability matching, hedging techniques, income diversification, risk management policies, and scenario analysis. Additionally useful methods for controlling the length gap are risk modeling and scenario analysis. With the use of these tools, institutions may evaluate the possible effects of various interest rate scenarios on their portfolios and decide for themselves how to manage the duration gap.

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