Govind Gurnani, Former AGM, RBI

Risk Assessment Methods In The Banking Sector

The banking sector has a huge role to play in the development of the economy. Certainly, it is the driver of the economic growth of the country. It plays an important role in identifying the idle resources for their efficient utilisation to attain maximum productivity. However, this process involves risks. Banks are highly regulated in order to promote financial stability, foster competition, and protect consumers. And since the risk is directly proportional to returns, the more risk a bank take, the higher it can generate profits. Hence, measuring risks in banks is a critical aspect of risk management to ensure the stability and soundness of the financial institution.

In 2023, when the US and Europe banking turmoil had taken place, the then Reserve Bank of India Governor Shaktikanta Das had said "the recent developments in the US and Europe banking system drive home the importance of ensuring prudent asset liability management, robust risk management and sustainable growth in liabilities and assets in the banking sector, among others.”

Risk assessment refers to identifying and mitigating risks that banks face in their day-to-day operations. It is a comprehensive approach involving various risk management tools, techniques, and methodologies to manage risks effectively.

The objective of risk management in banking is to minimise the impact of risks on the bank's operations, financial performance, and reputation.

■Types Of Risks Faced By The Banks

1. Credit Risk
2. Market Risk
3. Liquidity Risk
4. Interest Rate Risk
5. Investment Risk
6. Operational Risk
7. Compliance and Legal Risk
8. Counterparty Credit Risk
9. Reputational Risk
10. Concentration Risk
11. Cybersecurity Risk
12. Foreign Exchange Risk
13. Financial Crime Risk
14. Country Risk
15. Solvency Risk
16. Environmental, Social and Governance Risk

17. Open Banking Risk
18. Systemic Risk
19. Strategic Risk

1. Credit Risk

Credit risk refers to the potential loss arising from a bank borrower or counterparty failing to meet its obligations in accordance with the agreed terms. Credit risk analysis is the means of assessing the probability that a customer will default on a payment before you extend trade credit.

■ Key Factors In Credit Underwriting

▪ Credit Score

An important consideration in the underwriting process, the credit score shows the borrower's creditworthiness based on their credit history, payment history, and credit utilisation. A higher credit score means a lesser credit risk, and vice versa.

▪ Credit History

Lenders examine a borrower's credit history to gain insight into their previous financial behavior, which includes loan repayments, credit card usage, and any delinquencies. A good credit history increases the chances of loan approval.

- **Income and Employment Stability**

The borrower's income and employment history are important considerations in underwriting. A consistent and substantial revenue stream reassures lenders of the borrower's ability to repay loans on schedule.

- **Debt-to-Income Ratio**

The debt-to-income ratio (DTI) compares a borrower's monthly loan commitments to their monthly income. A lower DTI ratio shows better debt management capacity and increases loan approval prospects.

- **Collateral**

In case of secured loans, the lenders analyse the value and condition of collateral given by the borrower as a backup repayment source in the event of secured loans.

Credit Risk Assessment Models

- **Credit Scoring Models**

Credit scoring models are statistical tools that evaluate creditworthiness and determine the likelihood of default on credit obligations. These models are used by credit bureaus & lenders to assess the risk of lending money or extending credit to individuals or businesses.

The credit scoring model evaluates various factors, including payment history, credit utilisation, length of credit history, types of credit accounts, & recent credit inquiries. Each factor is assigned a weight, and the model's formula calculates a credit score based on the evaluation.

A credit score typically ranges from 300 to 900, with a higher score indicating a lower risk of default. Lenders use credit scores to make decisions about loan terms, including interest rates, repayment periods, and loan amounts. A good credit score can result in favorable loan terms, while a poor score can lead to higher interest rates and less favorable terms.

■ Credit Risk Models

Credit risk model is a method that uses statistical techniques to evaluate a borrower's creditworthiness and estimate the likelihood of them defaulting on their payments.These models can range from simple credit scoring models to complex models that consider multiple factors, including:

- Financial statements
- Credit bureau data
- Alternate data

■ Scenario Analysis

Scenario analysis involves generating hypothetical scenarios that can negatively influence the credit portfolio. Typically, these involve economic downturns, changes in regulatory requirements, and natural disasters.

Financial institutions develop these scenarios based on historical data and expert opinion. It helps in understanding the following:

- Effect of changes in interest rates.
- Exchange rates or commodity prices.

For instance, financial institutions can use scenario analysis to determine the impact of a 1% rise in interest rates on their credit portfolios. Scenario analysis is simple to implement and understand and provides a clear view of the possible impact of individual risk factors under defined conditions.

However, the scenarios usually are based on historical data and hence may not be relevant in forecasting future occurrences. Thus, it may not be adequate in covering all the possible risks or real-world scenarios.

■ Sensitivity Analysis

Sensitivity analysis evaluates the changes in some variables on the credit portfolio. It relies on single variables, such as interest rates or unemployment, that are incrementally changed to observe the impacts and identify the consequences.

Sensitivity analysis allows for the identification of key risk drivers and conducting a deep analysis of isolated variables. However, it relies on individual variables—with no interplay among them —and therefore, many systemic or interconnected risks can remain undetected.

■ Stress Testing Methods For Assessment Of Credit Risk

1️⃣ Sensitivity Analysis

■ Involves the impact of a large movement on single factor or parameter of the model

■ Used to assess model risk, effectiveness of potential hedging strategies, etc.

2️⃣ Scenario Analysis

■ Full representations of possible future situations to which portfolio may be subjected

- Involves simultaneous, extreme moves of a set of factors
- Reflects individual effects and interactions between different risk factors, assuming a certain cause for the combined adverse movements
- Used to assess particular scenarios (e.g., current forecast, worst-case) to gain better.

3 Event-driven Scenarios

Scenario is based solely on a specific event independent of the portfolio characteristics.

- Identify risk sources/events that cause changes in market
- Identify effects of these changes on the risk parameters

4 Portfolio-driven Scenarios

Scenario is directly linked to the portfolio:

- Identify risk parameters changes that result in a portfolio change. Identify events that cause the parameters to change
- May be drawn from expert analysis or quantitative techniques

5 Macroeconomic Scenarios

An shock to the entire economy that will affect industries to different degrees

■ Occurs external to a firm and develops over time e.g.changes in unemployment in a region, movement towards a recession, etc.

6️⃣ Market Scenarios

A shock to the financial and capital markets :
This shock may be historical or hypothetical, though historic events help support the plausibility e.g. stock market crash of early 2000s, change in interest rates, shock to credit spreads in a sector.

7️⃣ Worst Case/Catastrophe Scenarios

Events are exogenous to the markets or economy, though impact arises through resulting changes. Such events are often tied to specific characteristics of portfolio or exposures, e.g. terrorist attack on major financial center, change in regulations or policies.

■ Factors Affecting Credit Risk Modelling

For lenders to minimise credit risk, credit risk forecasting needs to be more precise. Here are some factors to consider:

Probability of default

Probability of default (PD) is the likelihood that a borrower will fail to pay their loan obligations, and lenders use it to assess the level of risk that comes

with loaning money. For individual borrowers, the PD is typically based on two primary factors:
1. Credit score
2. Debt-to-income ratio

Loss Given Default

Loss given default (LGD) refers to the amount of money a lender is likely to lose if a borrower defaults on a loan, helping them predict and manage their risk exposure. LGD accounts for:

- Value of the collateral
- The type of loan
- The legal framework in which the lender operates

It helps lenders with credit risk management and make informed decisions about loan pricing and underwriting.

Exposure At Default

Exposure at default refers to the amount of possible loss a lender is exposed to at any point in time, allowing them to better manage their risk. It considers factors including:

- The outstanding principal balance
- Accrued interest
- Any fees or penalties associated with the loan

2. Market Risk

Market risk is the risk of losses on financial investments caused by adverse price movements. Examples of market risk are: changes in equity prices or commodity prices, interest rate movements or foreign exchange fluctuations.

For assessment of market risk, there are mainly two approaches :

- Value at Risk Model
- Sensitivity Analysis Model

■ Value At Risk Model

Value at Risk (VaR) is a statistic that is used in risk management to predict the greatest possible losses over a specific time frame. VaR modeling is a statistical risk management method that quantifies a stock's or portfolio's potential loss as well as the probability of that potential loss occurring.

VaR is defined as the maximum amount expected to be lost over a given time horizon, at a pre-defined confidence level. For example, if the 95% one-month VAR is ₹1 million, there is 95% confidence that over the next month the portfolio will not lose more than ₹1 million.

VaR can be calculated using different techniques. Under the parametric method, also known as variance-covariance method, VaR is calculated as a function of mean and variance of the returns series, assuming normal distribution. With the historical method, VaR is determined by taking the returns belonging to the lowest quintile of the series (identified by the confidence level) and observing the highest of those returns. The Monte Carlo method simulates large numbers of scenarios for the portfolio and determines VAR by observing the distribution of the resulting paths.

■ Sensitivity Analysis Model

Sensitivity analysis to market risk reflects the degree to which changes in interest rates, foreign exchange rates, commodity prices, or equity prices can adversely affect a financial institution's earnings or capital. Sensitivity analysis determines how different values of an independent variable affect a particular dependent variable under a given set of assumptions. Market variables like interest rates, exchange rates, asset prices, etc., impact businesses significantly. Analysts can analyse these variables to help organisations evade exposure to market risks and develop necessary hedging strategies.

Sensitivity analysis can be carried out manually or using a Microsoft Excel spreadsheet.However,

manual calculations might seem challenging if the dataset is vast.

3. Liquidity Risk

Liquidity risk is the risk of loss resulting from the inability to meet payment obligations in full and on time when they become due. Liquidity risk is inherent to the Bank's business and results from the mismatch in maturities between assets and liabilities.

- **Gap Analysis**

Gap analysis is a method of asset-liability management and helps assess liquidity risk. Gap analysis assesses the maturity profile of assets and liabilities to identify potential funding gaps.

- **Stress Testing**

A liquidity stress test aims to measure the level of liquidity the institution must maintain to ensure a continuous ability to meet financial obligations in stressed conditions. It simulates adverse scenarios to evaluate the bank’s ability to withstand liquidity shocks.

4. Interest Rate Risk

Interest rate risk refers to the current or prospective risk to the bank's capital and earnings arising from adverse movements in interest rates.

For assessment of interest rate risk, there are five approaches :

1️⃣ Earnings at risk
2️⃣ Duration Analysis
3️⃣ Simulation Analysis
4️⃣ Gap Analysis
5️⃣ Value at Risk

◾ Earnings at Risk

Earnings at risk is a risk measurement of the amount by which net income may adversely change due to interest rates fluctuations. In simple words, earnings at risk measures the potential impact of interest rate changes on a bank's earnings.

◾ Duration Analysis

Duration analysis measures the sensitivity of a bond's or fixed income portfolio's price to changes in interest rates.

Simulation Analysis

Simulation analysis involves using computer models to estimate the potential impact of various interest rate scenarios on a bank's financial position and performance.

Gap Analysis

Gap analysis is a commonly used method for measuring interest rate risk. It involves comparing the repricing of assets and liabilities within specified time periods, which helps identify potential mismatches that could affect a bank's net interest income.

Using gap analysis, banks can assess their exposure to repricing risk and develop strategies to mitigate the potential impact of interest rate changes.

However, this method may not fully capture the complexity of a firm's interest rate risk exposure, particularly when considering yield curve risk and optionality risk.

Value At Risk

Value at Risk (VaR) is a statistical technique used to estimate the potential losses a bank could incur due to changes in market factors, including interest rates.

VaR calculates the maximum potential loss a bank could experience within a specified time period and

confidence level. Using VaR, banks can quantify their interest rate risk exposure and develop strategies to manage this risk.

5. Investment Risk

Investment risk refers to the possibility of losses due to the fall in the price of a security like stocks, bonds, and mutual funds.

■ Measurement Tools Of Investment Risk

1️⃣ Standard Deviation

Standard deviation measures how much the returns on an investment can differ from the average return. Consider two mutual funds: Fund M, focusing on IT sector stocks, and Fund N, investing in a mix of government bonds and stocks. If Fund M's returns swing widely compared to Fund N's, Fund M has a higher standard deviation, indicating higher risk.

2️⃣ Alpha

Alpha is a way to see if an investment has earned more or less than its expected risk level suggests. It's like a student aiming to score 85% but ends up scoring 90%, where the extra 5% is the "alpha." For an Indian investor, a mutual fund that outperforms its benchmark index (like the Nifty 50) after adjusting for

risk, has a positive alpha, showing it's done better than expected.

3️⃣ Beta Coefficient

Beta measures how much an investment's price moves compared to the overall market. A stock with a beta of 1.2 on the Bombay Stock Exchange (BSE) is 20 percent more volatile than the market. This means if the BSE goes up by 10 percent, the stock might go up by 12 percent, offering higher risk and potentially higher returns.

4️⃣ R-Squared

R-squared values show how closely an investment's movements match the market's movements. In India, if a mutual fund's R-squared value against the NSE Nifty is high, it means most of its performance can be explained by the Nifty's movements. This helps investors understand how much of the fund's performance is influenced by market trends.

5️⃣ Value at Risk (VaR)

VaR predicts the maximum loss an investment might face with a certain level of confidence. For instance, if a portfolio of Indian equities has a 5% VaR of ₹1 lakh over a month, there's a 5% chance it could lose more than ₹1 lakh in that timeframe. It's a tool for assessing potential losses in the Indian market.

6️⃣ Sharpe Ratio

Sharpe Ratio compares the return of an investment to its risk, adjusted for the risk-free rate (like returns from Indian government bonds). A higher Sharpe Ratio means better risk-adjusted returns. For example, comparing two Indian equity funds, the one with the higher Sharpe Ratio has provided better returns for the risk taken.

7️⃣ Conditional Value at Risk (CVaR)

CVaR provides a deeper look into potential losses beyond VaR, focusing on the worst-case scenarios. If an Indian investor's portfolio has a CVaR of ₹2 lakh, it means that in the worst 5% of cases, the average loss will be ₹2 lakh or more. This is crucial for understanding the extreme risks in the Indian market.

6. Operational Risk

Operational risk refers to the risk of loss due to errors, breaches, interruptions or damages, either intentional or accidental, caused by people, internal processes, systems or external events.

Banks that take a comprehensive approach to operational risk management (ORM) recognise four broad areas that requires attention :

1️⃣ People

Even in a digital age, employees and the customers with whom they interact can cause substantial damage when they do things wrong, either by accident or on purpose. Problems can arise from a combination of factors, including intentional and illegal breaches of policies and rules, sloppy execution, lack of knowledge and training, and unclear and sometimes contradictory procedures. Unauthorised trading, for example, can cause billions in direct losses and multimillions more in regulatory, legal and restructuring costs.

2️⃣ Information Technology (IT)

Systems can be hacked and breached; data can be corrupted or stolen. The risks banks face extend to the third-party IT providers that so many banks now rely on for cloud-based storage and other services. Systems can slow down or crash, leaving customers unable to access ATMs or mobile apps. Even the speed of technological change presents an operational risk. With the cyber landscape evolving so rapidly, banks can have trouble keeping up with new threats.

3️⃣ Organisational Structure

By setting aggressive sales targets and rewarding employees for how well they meet them, the bank management can encourage, and, in some cases,

explicitly condone inappropriate risk taking. Such activity, when exposed, can lead to management changes, shareholder losses and regulatory fines.

4️⃣ Regulation

The fourth area that vexes ORM planners is regulation. Since the global financial crisis, regulators have increased the number and complexity of rules that banks must follow. The banks that operate in multiple jurisdictions can face overlapping, inconsistent and conflicting regulatory regimes. Lapses can be expensive and embarrassing, triggering regulatory sanctions and customer defections. As is the case with technology, the speed and magnitude of regulatory change can be daunting. Even as banks are trying to contain costs, they must invest in the people, systems and processes that foster compliance.

7. Compliance & Legal Risk

Compliance risk refers to the potential damage banks face when they fail to comply with industry standards, laws and regulations. This risk involves both financial penalties and reputational damage. Legal risk is when a bank fails to comply with regulations or contractual terms. It is caused by internal errors, flawed processes, and deliberate infractions.

- **Regulatory Compliance Audits**

Ensures adherence to regulatory requirements.

- **Legal Risk Assessments**

Identifies and manages legal risks associated with contracts, litigation, and other legal matters.

8. Counterparty Credit Risk

Counterparty credit risk (CCR) is the risk that the counterparty to a transaction could default before the final settlement of the transaction's cash flows. An economic loss would occur if the transactions or portfolio of transactions with the counterparty has a positive economic value at the time of default.

From OTC derivatives trading to prime brokerage, securities lending, and repos, CCR is inherently bound to the daily operations of markets businesses and markets environments. It is most often manifested in default risk, replacement risk and settlement risk—albeit at the tail end of probabilities.

In 2021, the collapse of Archegos Capital Management highlighted the risks of counterparty credit risk and the need for banks to improve their management of these risks.

■ BCBS Guidelines On Assessment And Managing CCR

1️⃣ Conduct comprehensive due diligence of counterparties both at initial onboarding and on an ongoing basis. The aim is to ensure banks have a full understanding of the risks they are taking before they make key credit risk decisions and that they are able to act swiftly and with sufficient information on the changing risk profiles of counterparties during times of stress.

2️⃣ Develop a comprehensive credit risk mitigation strategy to effectively manage counterparty exposures. This entails the use of robust contractual terms and tools such as risk-sensitive margining

3️⃣ Measure, control, and limit counterparty credit risk using a wide variety of complementary metrics. This should be done while ensuring that counterparty credit risk metrics comprehensively cover the bank's range of material risks, portfolios, and counterparties.

4️⃣ Build a strong counterparty credit risk governance framework. This should be guided by clear risk management processes, including limits and escalations, and supported by informative and reliable reporting that is integrated into decision-making processes.

9. Reputational Risk

Reputational risk is associated with an institution losing consumer or stakeholder trust. It's the risk that those consumers and stakeholders will take on a negative perception of the bank following a particular event.

- **Customer Feedback and Surveys** Monitors customer satisfaction and feedback.

- **Media Monitoring**

Keeps track of media coverage and public perception.

10. Concentration Risk

Concentration risk refers to the potential for financial loss due to an overexposure to a single counterparty, sector, or geographic region.The presence of concentration risk increases the vulnerability of a portfolio to market fluctuations and economic downturns.

- **Portfolio Diversification Analysis**

Examines the concentration of risks across various segments.

- **Geographic and Industry Exposure Analysis**

Assesses risk concentrations in specific regions or industries.

11. Cybersecurity Risk

Cybersecurity risk is the probability of exposure or loss resulting from a cyber attack or data breachon your organisation. It involves identifying potential threats and vulnerabilities in your organization's digital systems and networks. The risk is not only about the likelihood of a cyberattack but also the potential consequences, such as financial loss, reputational damage, or operational disruption.

■ Strategies For Managing Cybersecurity Risk

- **Vulnerability Assessments**

Identifies weaknesses in the bank's cybersecurity infrastructure.

- **Incident Response Planning**

Prepares for and responds to cybersecurity incidents.

12. Foreign Exchange Risk

Foreign exchange risk is the chance that a bank will lose money on international trade because of currency fluctuations.

1️⃣ External Forex Risk Mitigation Strategies

- forward contracts
- currency futures
- currency options
- currency swaps

2️⃣ Internal Forex Risk Mitigation Strategies

- Invoicing in own currency
- Build protection into your commercial relationships/contracts
- Natural foreign exchange hedging
- Hedging arrangements via financial instruments

13. Financial Crime Risk

Financial crime risk refers to any kind of criminal conduct relating to money or to financial. services or markets, including any offence involving: (a) fraud. or dishonesty; or (b) misconduct in, or misuse of information. relating to, a financial market; or (c) handling the proceeds of.

- Implement KYC ID verification measures
- Perform FATF recommended due diligence measures

- Record Maintenance of high risk clients
- Monitoring of accounts for suspicious financial activity & its reporting to RBI.

14. Country Risk

Country risk refers to the ability and willingness of borrowers within a country to meet their obligations. It is thus a credit risk on obligations advanced across borders. Assessment of country risk relies on the analysis of economic, social and political variables that relate to the particular country in question. Although the economic factors can be measured objectively, the social and political variables will often involve subjective judgments.

Country risk can be categorised under two headings. The first sub-category of country risk is sovereign risk, which refers to both the risk of default by a sovereign government on its foreign currency obligations, and the risk that direct or indirect actions by the sovereign government may affect the ability of other entities in that country to use their available funds to meet foreign currency debt obligations.

In the former case, sovereign risk addresses the credit risk of national governments, but not the specific default risks of other debt issuers. Here, credit risk relates to two key aspects: economic risk,

which addresses the government's ability to repay its obligations on time, and political risk, which addresses its willingness to repay debt. In practice, these risks are related, since a government that is unwilling to repay debt is often pursuing economic policies that weaken its ability to do so.

15. Solvency Risk

Solvency risk refers to the risk of having insufficient capital to cover losses generated by all types of risks, and is thus effectively the risk of default of the bank. From a regulatory viewpoint, the issue of adequate capital is critically important for the stability of the banking system.

To address solvency risk, it is necessary to define the level of capital which is appropriate for given levels of overall risk. The key principles involved can be summarised as follows:

- Risks generate potential losses.

- The ultimate protection for such losses is capital.

- Capital should be adjusted to the level required to ensure capability to absorb the potential losses generated by all risks.

To implement the latter, all risks should be quantified in terms of potential losses, and a measure of aggregate potential losses should be derived from the potential losses of all component risks.

16. Environmental, Social and Governance (ESG) Risk

Environmental, social, and governance events, from climate change to diversity and inclusion policies, can have material impact on the value of investments. Banks must proactively measure and manage these risks, integrating ESG data, scoring models, and climate models into the investment process and credit risk evaluations.

17. Open Banking Risk

An open banking ecosystem functions as a single platform for a number participants like regulators and government agencies, data providers, third-party providers, customers, to engage in an open infrastructure with an end motive to enhance the customer experience.

Aggregated customer data such as transactions maintained in the third-party provider's(FinTech startup's) infrastructure and servers, can cause significant risk to the bank's cybersecurity. Banks need to move quick in complying with PSD2 and

GDPR directives laid down by independent government agencies, and the financial regulatory bodies to avoid exposing themselves to a myriad of systemic risks which could lead to financial as well as reputational damages.

18. Systemic Risk

Systemic risk includes a possibility of bringing down the entire financial system to a standstill, what was possibly seen during the global financial crisis 2008. This is caused due to a domino effect where the failure of one bank could ripple down the failure of its counterparties/other stakeholders, which could, in turn, threaten the entire financial services industry.

The Volatility Index(VIX) is a good measure of systemic risk. Systemic risk, in itself, would not lead to direct losses. However, in a scenario where VIX is at high levels, there is a high probability of market risks(and other risks) to reach very high levels which would eventually lead to losses.

19. Strategic Risk

Strategic risk encompasses risks concerning the long-term functioning of a financial institution. It embraces various variables, such as corporate governance and factors based on market characteristics and stakeholders.

■ Measuring Strategic Risk

To effectively measure strategic risk, two key metrics are commonly used: economic capital and risk-adjusted return on capital.

1️⃣ **Economic capital** refers to the amount of capital that a company needs to cover potential losses resulting from risks. It provides a clear understanding of the financial resources required to withstand unexpected events.

2️⃣ **Risk-adjusted return on capital** is a measure that incorporates the level of risk taken to generate returns. It helps assess whether the returns on investments justify the risks undertaken by the organisation.

****