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Module-B Unit-4

CAIIB PAPER-2

BANK Financial Management(BFM)

CAIIB Paper 2 (BFM) Module B Unit 4: Market Risk

Market Risk In Banks

Banks also have several activities and undertake transactions that result in market exposure. They are not immune to these risks and have to face them too. All such transactions are reflected in the trading book.

A trading book consists of a bank's proprietary positions in financial instruments covering-

- Debt Securities
- Equity
- Foreign Exchange
- Commodities (not permitted in our country presently)
- Derivatives held for Trading

The trading book also includes positions in financial instruments arising from matched principal brokering and market making, or positions taken in order to hedge other elements of the trading book.

The proprietary positions are held with trading intent and with the intention of benefiting in the short-term, from actual and/or expected differences between their buying and selling prices or hedging other elements in the trading book.

A bank's trading book exposure has the following risks, which arise due to adverse changes in the market variables such as interest rates, currency exchange rate, Commodity prices, market liquidity, etc., and their volatilities impact the bank's earnings and capital adversely.

1.Market Risk

2.Liquidity Risk

- Asset Liquidity Risk
- Market Liquidity Risk

3.Credit and Counterparty risks

Note: The market liquidity risk is different from funding the liquidity risk that arises due to asset-liability mismatch and is a subject matter of Asset Liability management.

Market Risk

- **Market risk is the risk of adverse deviations of the mark-to-market value of the trading portfolio, due to market movements, during the period required to liquidate the transactions.**
- **The** period of liquidation is critical to assess such adverse deviations. If the period of liquidation of the position gets longer, the possibilities of larger adverse deviations from the current market value also increase.

Trading Liquidity Risk

Trading liquidity is the ability to freely transact in markets at reasonable prices. Trading liquidity is ability to liquidate positions without --

- Affecting market prices
- Attracting the attention of other market participants.

Trading liquidity allows one to transact without compromising on counter-party quality. Liquidation involves asset and market liquidity risks. Price volatility is not the same in high-liquidity and poor-liquidity situations.

The liquidity issue becomes critical in emerging markets. Prices in emerging markets often diverge considerably from a theoretical 'fair value'. Liquidation risk arise from lack of trading liquidity and results in

- Adverse change in market prices
- Inability to liquidate position at a fair market price
- Large price changes caused by liquidation of position
- Inability to liquidate position at any price

Credit and Counterparty Risks

- **Markets value the credit risk of issuers and borrowers and it reflects in prices. Credit risk of traded debts, such as bonds and debentures and commercial papers, etc**., is indicated by Credit Rating given by rating agencies.
- Credit rating indicates the risk level associated with the instruments and is factored into as add-ons to the risk-free rate of the corresponding maturity. The lower the risk level, the lower is the spread over risk-free rate.

Market Risk Management Framework

Market risk management involves finding answer to four key questions.

- What are the risks?
- What is the quantum? How much could the price change? What would be the effect on profit and loss?
- How can we monitor and control price risk?
- Can we reduce the risk? And, if so, then how?

Management processes for market risk management are designed essentially to answer these questions. Accordingly, management processes are sub-divided into the following four parts:

- Risk Identification
- Risk Measurement
- Risk Monitoring and Control
- Risk Mitigation

An effective market risk management framework in a bank comprises of risk identification, setting up of limits and triggers, risk monitoring, models of analysis that value positions or measure market risk, risk reporting, etc.

Financial instrument take their price from the market and that depends upon the interaction of market variables. Hence, market risk management processes do not have a risk pricing process.

But, management of market risk needs an organisation structure in place that can carry out the functions required for the purpose.

Organisation Structure

Management of market risk is a major concern of the top management of banks. Successful implementation of risk management process emanates from the top management in the bank. The main challenge centres on facilitating implementation of risk and business policies simultaneously in a consistent manner. Modern best practices consist of setting risk limits based on economic measures of risk while ensuring the best risk adjusted return keeping in view the capital that has been invested in the business. It is a question of taking a balanced view on risks and returns and within the constraints of available capital. **Usually, Market Risk Management organisation would consist:**

- The Board of Directors
- The Risk Management Committee
- The Asset-Liability Management Committee (ALCO)
- The ALM Support Group/Market Risk Group
- The Middle Office

The Risk Management Committee is a Board level Sub-Committee. The responsibilities of Risk Management Committee with regard to market risk management aspects include the following:

- Setting guidelines for market risk management and reporting
- Ensuring that market risk management processes conform to the policy
- Setting up prudential limits and their periodical review
- Ensuring robustness of measurement of risk models
- Ensuring proper manning for the processes

The Asset-Liability Management Committee (ALCO) is responsible for implementation of risk and business policies simultaneously in a consistent manner and decides on the business strategy to achieve these objectives. **Its role encompasses the following:**

- Product pricing for deposits and advances
- Maturity profile and mix of incremental assets and liabilities
- Articulating interest rate view of the bank
- Funding policy
- Transfer pricing
- Balance sheet management It set

Risk Identification

All products and transactions should be analysed for risks associated with them. While, various risks associated with a standardised product stand analyzed, the risks in case of a non-standard products need to be analysed. Therefore, the approach to deal in standard and non-standard products differs. We have seen under the general approach to risk management that the guidance for risk taking at the transaction level comes from the corporate level. It applies to the management of market risk too.

- Usually all standard products would have 'Product Programme' for each of them. All Risk- Taking Units operate within an approved Product Programme'. Product

programme defines procedures, limits and controls for all aspects of the product. The product programme also specifies market risk measurement at an individual product level and at aggregate portfolio level.

- New products or non-standard products may operate under a 'Product Transaction Memorandum' on a temporary basis while a full Market Risk Product programme is being prepared.

Risk Measurement

Market risk management framework is heavily dependent upon the quantitative measures of risk. The market risk measures seek to capture variations in market value arising out of uncertainties associated with various risk elements. These provide an objective measure of market risk in a transaction or of a portfolio. Market risk measures are based on -

- Sensitivity
- Downside Potential

Sensitivity

- **Sensitivity, as had been stated deviation of market price due to unit movement of a single market parameter. Supply-demand position, interest rate, market liquidity, inflation, exchange rate, stock prices, etc.,** are the market parameters, which drive market values.
- For example, change in interest rate would drive the market value of bonds and forward foreign exchange held in a portfolio. If liquidity in the market increases, it may result in increased demand which in turn may increase the market price.

Basis Point Value (BPV)

- This is the change in value due to 1 basis point (0.01%) change in the market yield. This is used as a measure of risk. The higher the BPV of a bond, higher is the risk associated with the bond. Computation of BPV is quite simple.

For example, a 5 year 6% semi-annual bond @ market yield of 8%, has a price of Rs. 92, which rises to Rs. 92.10 at a yield of 7.95%. So, for one BP fall in yield, market price

changes by Rs. 0.02 or gains by Rs. 2,000 per Rs. 1 crore face value. BPV of the bond is, therefore, Rs. 2,000. per crore face value.

This also helps us to quickly calculate profit or loss for a given change of yield. If the yield on a bond with BPV of 2,000 declines by 8 BPs, then that would result in a profit of 8 X 2000 = Rs. 16,000 per crore of face value. If one is holding Rs. 10,00,000 face value of this bond, he makes a profit of Rs. 1,600.

BPV changes with the remaining maturity. Suppose the bond described above has 5 years to mature and the present BPV is 2000, the BPV will decline with time and on the day of maturity it will be zero.

Duration or Modified duration is Macaulay's duration discounted by 1 period yield to maturity,

The longer the duration of a security, the greater will be the price sensitivity to yield changes and the higher would be the risk associated with the bond. Bond price changes can be estimated with the help of modified duration by using the following relationship.

Approx % change in price = — modified duration X yield change

Downside Potential

- **Risk materializes only when earnings deviate adversely. Downside potential captures the possible losses only and ignores the profit potential.** Downside risk is the most comprehensive measure of risk as integrates sensitivity and volatility with the adverse effect of uncertainty.
- **Th**is is the measure that is most relied upon by banking and financial service industry as also the regulator.

Yield Vs Price Volatility

- **Yield volatility is the degree of variance in yield. This is largely unaffected by time and duration. The volatility rises as yields fall.**
- Price volatility is degree of variance in price. This is largely unaffected by yield and substantially affected by time and duration.

Price Volatility = (Yield volatility BPV x Yield)/Price

There are three main approaches to calculating value-at-risk:

- The correlation method, also known as the variance/covariance matrix method
- Historical simulation
- Monte Carlo simulation

Why VaR is Useful?

- Good tool for all banks, financial institutions, multinationals, fund managers for protection of customers, shareholders, employees and overall franchise of the business.
- Translates portfolio exposures into potential impact on Profit and Loss.
- Aggregates and reports multi-product, multi-market exposures into one number.
- Meets external risk management disclosure and expectations.
- A vital component of current best practices in risk measurement.
- Embraced by practitioners, regulators and academicians.
- Valuable as a probabilistic measure of potential losses.

Limitation of VaR

VaR is not worst-case scenario. It does not measure losses under any particular market conditions. VaR by itself - is not sufficient for risk measurement. Measures to get over the limitation include back testing and model calibration and scenario analysis and stress testing.

Role of VaR in Control and Monitoring

- Estimating Valatility
- Back Testing
- Stress Testing

Risk Monitoring And Control

- Risk monitoring and control calls for implementation of risk and business policies simultaneously. It consists of setting the market risk limits or controlling the market risk, based on the economic measures of risk while ensuring the best risk adjusted return.
- Controlling market risk means keeping the variations of the value of a given portfolio within the given boundary values through actions on limits, which are upper bounds imposed on risks.

This is achieved through the following:

- Policy guidelines limiting roles and authority
- Limit structure and approval process
- System and procedures to unbundle products and transactions to capture all risks
- Guidelines on portfolio size and mix
- System for estimating portfolio risk under normal and stressed situations
- Defined policy for mark-to-market
- Limit monitoring and reporting
- Performance Measurement and Resource Allocation

Limits and Triggers

Approved market risk limits for factor sensitivities and Value at Risk are duly set by the designated authority (usually by the Risk Policy Committee). The approval is based on the unit's capacity and capability to perform within those limits, effectiveness of controls and trading revenues.

- Sensitivity and Value at Risk limits for trading portfolios and accrual portfolios are measured daily. Where market risk is not measured daily, Risk Taking Units must have procedures that monitor activity to ensure that they remain within approved limits at all times.
- Approved management triggers or stop-loss limits for all mark to market risk taking activities.
- Appropriate market risk limits for basis risk for the products, wherever applicable, in the Market Risk Product Programme.

Risk Monitoring

- A monitoring process to ensure that all transactions are executed and revalued at the prevailing market rates. The rates used at inception or for periodic marking to market for risk management or accounting purposes must be independently verified.

- Financial Models used for revaluations for income recognition purposes or to measure or monitor Price Risk must be independently tested and certified.
- Stress tests must be performed preferably quarterly with predetermined changes in the underlying assumptions of the model/market conditions.

Models of Analysis

- Appropriate and duly approved (usually by Risk Policy Committee) model control and certification policy.
- Fully documented financial models.
- Duly validated by the designated person, to ensure that the algorithm employed is appropriate and accurate. At least once in a year, the model should be validated by a98 reputed external agency also.
- No unauthorized or unintended changes should be made in models.
- The models should also be subject to model assumption review on a periodic basis.

Risk Reporting

Risk report should enhance risk communication across different levels of the bank, from the trading desk to the CEO. In order of importance, senior management reports should be -

- Regular and in time
- Reasonably accurate
- Including highlights of portfolio risk concentrations & exceptional events
- Containing written commentary
- Concise.

Managing Trading Liquidity

Risk of trading liquidity is managed by avoiding –

- Large market share in any given type of asses
- Infrequently traded instruments
- Instruments with unusual tenors
- One-sided liquidity in the market

Risk Terminology in Risk Measurement

Say Mr. Abhinav takes a position in stock 'A' and wants to explain to his 'Boss' about the market position. He can explain the position in three possible ways:

- He tells his Boss that he purchased 1,000 shares of stock 'A' at Rs. 600 per share
- He tells his Boss that he has taken a Rs. 600,000 position in stock 'A'
- He tells his Boss that he invested in stock "A" . He explains that if price changes by 1%, he would have an impact of Rs. 6,000. But since the price is expected to fluctuate 3% daily (daily volatility - figure estimated from past data), he estimates the daily potential loss to be Rs. 41,868

Mr. Abhinav's position analysis using risk terminology will be:

- Market factor - Stock price
- Market Factor Sensitivity - Rs. 6,000 (1% of total position)
- Volatility (Daily) - 3%
- Defeasance period - 1 day (i.e., to sell the stock)
- Defeasance factor - at 3% volatility it is 3 x 2.326 (@ 99% Confidence level)
- Value at Risk (VaR) - Rs. 41,868 - This is also the potential loss amount under normal market conditions.

Risk Mitigation

Market risk arises due to volatility of financial instruments. The volatility of financial instruments is instrumental for both profits and risk. Risk mitigation in market risk, i.e., reduction in market risk is achieved by adopting strategies that eliminate or reduce the volatility of the portfolio. However, there are couple of issues that are also associated with risk mitigation measures

- Risk mitigation, measures aim to reduce downside variability in net cash flow but it also reduces the upside potential or profit potential simultaneously,
- In addition risk mitigation strategies, which involve counterparty, will always be associated with counterparty risk. Of course, where counterparty is an established 'Exchange' or a central counterparty, counterparty risk gets reduced very substantially. In OTC deals, counterparty risk would depend upon the risk level associated with party to the contract.

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