



## **Summary Sheet – Helpful for Retention**

### **For**

## **Risk Management in Banking Sector**

### **Important Points**

1. This Summary Sheet shall only be used for Quick Revision after you have read the Complete Notes
2. For Building Concepts along with examples/concept checks you should rely only on Complete Notes
3. It would be useful to go through this Summary sheet just before the exam or before any Mock Test
4. Questions in the exam are concept based and reading only summary sheets shall not be sufficient to answer all the questions

## 1 Definition of Risk

An activity which may give profits or result in loss may be called a risky proposition due to uncertainty or unpredictability of the activity of trade in future. In other words, it can be defined as the possibility of loss.

Example- Ram bought a piece of land today assuming he will sell it at higher price 1 year later is a activity which has risk in it because there is no guarantee that prices will increase next year. He might make a loss if prices decline next year

***Lower risk implies lower variability in net cash flow with lower upside and downside potential. Higher risk would imply higher upside and downside potential.***

Now suppose you invest in bonds issued by RBI at 5% per annum. Here you do not face any risk because RBI will always return the money back. Even if RBI goes into loss, it can print money. So, this is risk free investment. But here the return of 5% would be lower than what you would get from other investments which are risky.

***Zero-Risk would imply no variation in net cash flow. Return on zero-risk investment would be low as compared to other opportunities available in the market***

### 1.1 Linkage among Risk, Capital

A business with large variation in net cash flow would be a business with higher risk. The profit potential and loss possibilities would be higher in such businesses due to higher variability of net cash flow. **Capital requirements would be higher because of possibilities of higher losses.** Similarly, **Capital requirements would also be lower because of possibilities of lower losses.**

### 1.2 Linkage among Risk and Return

Returns expected from a business would be in relation to the risks associated with the business. To understand risk and return linkage, let us take an example. Let us say there are two investment opportunities before you. Cash flows from both these investments over a five-year period are given below

1 Cash Flow from	Year I	Year 2	Year 3	Year 4	Year 5	Total
Investment I	6	6	6	6	6	30
Investment 2	3	9	5	-2	15	30

If we ignore the time value of money, both these investments yield Rs 30,000 over five-year period or @12% p.a. simple, assuming initial investment at Rs 50,000. From return-on-investment point of view both are equal, but intuitively, without going into the arithmetic, one is more likely to prefer Investment 1. This is because of steady stream of cash flow associated with it. Investment 2 would not be preferred because it is not giving a constant stream of flows which makes it riskier.

Investment 2 would have a chance to become equally acceptable provided return on it is higher than what it is now, say @14% p.a. simple. This 2% additional return is the risk premium or cost of risk. **Higher the risk is higher would be this premium**

## 2 Type of Risks

The major risks in banking business or ‘banking risks’, as commonly referred, are listed below –

1. Liquidity Risk
2. Interest Rate Risk
3. Market Risk
4. Credit or Default Risk
5. Operational Risk

### 2.1 Liquidity Risk

The liquidity risk of banks arises mainly from funding of long-term assets by short-term liabilities, thereby making the liabilities subject to rollover or refinancing risk. Liquidity Risk is defined as the inability to obtain funds to meet cash flow obligations at a reasonable rate. Liquidity Risk can be of following types

1. **Funding Risk:** Funding Liquidity Risk is defined as the inability to obtain funds to meet cash flow obligations.
2. **Time Risk:** Time risk arises from the need to compensate for non-receipt of expected inflows of funds i.e., performing assets turning into non-performing assets. People defaulting on loans can lead to Time risk.
3. **Call Risk:** Any future contingency such as bank losing a legal battle resulting in huge fines to the bank can result in outflow of money which is called Call Risk.

### 2.2 Interest Rate Risk

Interest Rate Risk arises due to movement in Interest rates

**Example:** Bank has given money for 20 years at 8% Rate but borrowed it for 5 years at 7.5 %. Here the bank is assuming that after 5 years it would again borrow at 7.5 %. But if after 5 years the borrowing rate is increased to 9%. In such a case bank would make loss due to Interest rate movements

#### 2.2.1 Types of Interest Rate Risk

1. **Gap or Mismatch Risk:** A gap of mismatch risk arises from holding assets and liabilities with different principal amounts, maturity dates or repricing dates, thereby creating exposure to unexpected changes in the level of market interest rates. The example discussed in above where bank has given loan for 20 years is also Gap or Mismatch Risk

2. **Basis Risk:** The risk that the interest rate of different assets, liabilities items may change in different magnitude is termed as basis risk. Suppose bank has taken deposits from other people and has invested the money in Swaps. Now interest rates might change in such a way that interest rate on deposits decrease by 1% whereas interest rate on swaps decrease by 2%. So here banks will suffer a loss
3. **Yield Curve Risk:** In a floating interest rate scenario, banks may price their assets and liabilities based on different benchmarks, i.e., treasury bills' yields, fixed deposit rates, call money rates, MIBOR, etc. In case the banks use two different instruments maturing at different time horizon for pricing their assets and liabilities, any non-parallel movements in yield curves would affect the NII
4. **Embedded Option Risk:** Significant changes in market interest rates create the source of risk to banks' profitability by encouraging prepayment of cash credit/demand loans term loans. **For example**, if someone has taken a loan at floating rate and right now the rate is **8%**. After some time, if the interest rate increases to 10% then the person might be tempted to return the loan early instead of giving higher interest.
5. **Reinvestment Risk:** Uncertainty with regard to interest rate at which the future cash flows could be reinvested is called reinvestment risk. **Suppose** bank has given a loan to someone at 8% for 5 years. Now after 5 years the interest rates might be different, and bank might have to reinvest the amount at 6%

### 2.3 Market Risk (Also known as Price Risk)

The market risk arises due to unfavorable movement in market prices in the investments done by bank. Suppose bank has invested in Equities (Stock market) but stock market crashes then banks would make a loss. Market Risk is also called **Price Risk**

**Market Risk is of following types:**

1. **Currency Risk or Foreign Exchange Risk:** This is also called **Forex Risk**. Suppose bank has invested 1000 Dollars in US bank. When it invested each dollar was of Rs. 60 which means bank invested Rs. 60,000. But after certain days the dollar becomes of Rs. 58 which means bank will get only Rs. 58,000 on that day. You will learn about currency movements later in the course
2. **Like Currency risk** there are **Commodity Price Risk** and **Equity Price Risk** corresponding to adverse price movements in commodities and Equities
3. **Market Liquidity Risk:** Market liquidity risk arises when a bank is unable to conclude a large transaction in an instrument near the current market price. For example, the current price of share is 30 and bank wants to buy 10,000 shares. But only 500 are

available at 30 and rest of 500 are available at 33. In this case bank will have to average price of 31.5 to buy 1000 shares. So, bank will buy at price far away from the current price of 30. This is called Market Liquidity Risk

4. **Even Interest Rate risk** is also a market risk because adverse movement in interest rate can impact the value of investments

## 2.4 Default or Credit Risk

Credit risk is more simply defined as the potential of a bank borrower or counterparty to fail to meet its obligations in accordance with the agreed terms

1. **Counterparty Risk:** This is a variant of Credit risk and is related to non-performance of the trading partners due to counterparty's refusal and or inability to perform. For example, when a person fails to pay the monthly payment then it is called Counter Party Risk.
2. **Country Risk:** This is also a type of credit risk where non-performance of a borrower or counterparty arises due to constraints or restrictions imposed by a country. Here, the reason of non-performance is external factors on which the borrower or the counterparty has no control. **So Cross Border Exposure can lead to country risk**

## 2.5 Operational Risk

Operational loss has mainly three exposure classes namely people, processes and systems. In other words, it arises due to bad **intentions of staff, hacking of systems or wrong systems** in place to meet the compliance. The **failure in internal controls or corporate governance** which leads to financial loss through **error or frauds** is also part of operational risk

1. **Transaction Risk:** Transaction risk is the risk arising from fraud, both internal and external, failed business processes and the inability to maintain business continuity and manage information. **Online theft in a bank account is an example of Transaction Risk**
2. **Compliance Risk/Legal Risk:** Compliance risk is the **risk of legal or regulatory sanction**, financial loss that a bank may suffer because of its failure to comply with any or all of the applicable laws. **For example, bank not complying with corporate governance guidelines or rules is an example of Compliance risk due to which RBI may take a legal action against the bank or put a penalty on the bank.**

## 2.6 Other Risks

1. **Strategic Risk:** Strategic Risk is the risk arising from adverse business decisions, improper implementation of decisions or lack of responsiveness to industry changes.

2. **Reputation Risk:** Reputation Risk is the risk arising from negative public opinion. This risk may expose the institution to litigation, financial loss or decline in customer base.
3. **Systematic Risk:** The risk inherent to the entire market or an entire market segment. Systematic risk, also known as **undiversifiable risk**. It affects the overall market, not just a stock or industry. For example, if you invest all your money in equities then there is a risk that if equity markets crash, all your investments will go into loss. This type of risk is both unpredictable and impossible to completely avoid. It cannot be mitigated through diversification, only through hedging or by using the right asset allocation strategy. For example, putting some assets in bonds and other assets in stocks can mitigate systematic risk because an interest rate shift that makes bonds less valuable will tend to make stocks more valuable, and vice versa, thus limiting the overall change in the portfolio's value from systematic changes. Interest rate changes, inflation, recessions and wars all represent sources of systematic risk because they affect the entire market

### 3 Risk Identification in Banking Business

Banking business lines are many and varied. **Commercial banking, corporate finance, retail banking, trading and investment banking and various financial services** form the core business lines of banks. Various Products are offered in different business lines. The risk factors associated with different business lines also differ. From the risk management point of view, banking business lines may be grouped broadly under the following major heads.

1. The Banking Book
2. The Trading Portfolio
3. Off-Balance Sheet Exposures

#### 3.1 Banking Book

The banking book includes all advances, deposits, and borrowings, which usually arise from commercial and retail banking operations. All assets and liabilities are held till maturity.

1. Since all assets and liabilities in the banking book are held until maturity, maturity mismatch between assets and liabilities results in excess or shortage of liquidity. This is commonly known as '**Liquidity Risk**'
2. In addition, interest rate changes take place during the period, such assets and liabilities are held in the banking book. Therefore, interest rates on assets as well as liabilities change on their maturity. This affects net interest margin, i.e., interest received net of interest paid. This is called '**Interest Rate Risk**'.
3. Further, the asset side of the banking book generates credit risk arising from defaults in payments of principal and/or interest by the borrowers. This is called '**Default Risk**' or 'Credit Risk'
4. Since banking book is not open to market, **it is not exposed to market risk directly though indirectly through interest rate it can be**

5. In addition to all these risks, exposures under banking book suffer from what is termed as '**Operational Risk**'. These arise due to human failures of omission or commission, deficiencies in information system and system failure, inadequacy or non-adherence to internal processes, external events etc.

So, the banking book is mainly exposed to **liquidity risk, interest rate risk, default or credit risk and operational risk**

### 3.2 Trading Book

The trading book includes all the assets that are marketable, i.e., they can be traded in the market. Trading book mostly comprises of **fixed income securities, equities, foreign exchange holdings, commodities, etc.**, held by the bank on its own account.

1. Trading book is subject to adverse movement in market prices until they are liquidated. This is termed as '**Market Risk**'
2. Trading book is also exposed to **Credit Risk or Default Risk**, which arises due to failure on the part of the counter party to keep its commitment
3. Trading book is also exposed to **operational risks** that arise from human failures of omission or commission, deficiencies in information system and system failure, inadequacy or non-adherence to internal processes, external events, etc.

Trading book is mainly exposed to market risk, including liquidation risk, default or credit risk and operational risk. Trading does not face **Interest Rate Risk and Liquidity Risk**

### 3.3 Off-Balance Sheet Exposures

Off-balance sheet exposures occur only in circumstances where banks issue guarantees, committed or backup credit lines, letters of credit, etc., banks face payment obligations contingent up on some event. For example, if bank issue letter of guarantee that if a certain party does not pay then bank will pay in lieu of that part, bank will have to pay the money if the party for whom the guarantee is given defaults. These contingencies adversely affect the revenue generation of banks. **Derivatives are off-balance sheet market exposures.** They may be swaps, futures, forward contracts, foreign currency contracts, options, etc.

Off-balance sheet exposures may have **liquidity risk, interest rate risk, market risk, default or credit risk and operational risk**

## 4 Risk Management Frameworks

### 4.1 Role of RBI in Risk Management in Banks

There is body called **Board for Financial Supervision (BFS)** which works under the control of RBI and supervises all the financial institutions except Stock Markets (regulated by **SEBI**) and Insurance (regulated by **IRDA**).

Following are the Risk Management Frameworks

1. **General Risk Management Frameworks** in every Organization
2. BFS has been using **CAMELS** rating to evaluate the financial soundness of the Banks. The CAMELS Model consists of six components namely **Capital Adequacy, Asset Quality, Management, Earnings Quality, Liquidity and Sensitivity to Market risk**. This framework was recommended by Basel Committee on Banking Supervision of the Bank for International Settlements (**BIS**)
3. **Basel norms** (Basel 1, Basel 2 and Basel 3) are being implemented for Risk Management
4. **PCA (Prompt Corrective Action)** to take corrective actions

We will discuss these frameworks one by one

### 4.2 General Risk Management Framework in an Organization

Every Organization is supposed to have Risk Management Framework covering following Areas

1. Organization for Risk Management
2. Risk Identification
3. Risk Measurement
4. Risk Pricing
5. Risk Monitoring and Control
6. Risk Mitigation

#### 4.2.1 Organization to Risk Management

Usually, risk management organization consists of Board of Directors, Risk Management Committees, Committee of Senior level executives to manage risk

#### 4.2.2 Risk Identification

Risk identification consists of identifying various risks associated with the transaction.

Risk identification is best explained by taking an **example**. Say Branch B has extended a loan of Rs 1 crore in accordance with the corporate policy and guidelines for a period of 5 years at a



rate of interest 1% over BPLR (Base Prime Lending Rate) of the bank, BPLR being 10%. The loan is to be repaid in equal quarterly installments with one-year moratorium. Funding of the loan is to be done from a deposit of three years of the same amount, interest rate on it being 6%

What are the risks associated with the transaction?

**Liquidity Risks:** The deposit would become payable at the end of three years, whereas the loan would go on for next 2 years. At the end of three years, it will face **Funding Risk**. In case there is default, **Time Risk** would also arise. These would-be liquidity risks associated with the transaction

**Interest Rate Risks:** The interest on loan is linked to BPLR of the bank whereas the deposit is carrying a fixed rate of interest. If BPLR were reduced during the first three-year period, **Basis Risk would arise.** After the three-year period, when the question of funding the loan would arise, deposit rate may not remain same. So, the transaction would face **Gap or Mismatch Risk** at the end of three-year period. As the loans get repaid, the repayment proceeds must be deployed elsewhere. The rate at which this may be done may not be at par with the interest rate being charged on the loan amount. As a result, the bank would face **Reinvestment Risk.** There would always be a possibility that the loan amount is prepaid, or the deposit amount is withdrawn prematurely adding to the risk as **Embedded Option Risk**

### **Credit Default Risks**

In addition, there would be Default or Credit Risk and Operational Risks in the transaction.

#### **4.2.3 Risk Measurement**

Risk management relies on quantitative measures of risk. The risk measures seek to capture variations in earnings, market value etc. arising out of uncertainties associated with various risk elements. Quantitative measures of risks can be classified into three categories.

- Based on Sensitivity
- Based on Volatility
- Based on Downside Potential

#### **4.2.4 Risk Pricing**

Risks in banking transactions impact banks in two ways. Firstly, banks have to maintain necessary capital, at least as per regulatory requirements. The capital required is not without costs

Secondly, there is a probability of loss associated with all risks. This also needs to be factored into pricing. To explain this, let us take the case of a bank that has 100 credit accounts with say Level 2 risks according to some measure. The bank is offering loans at 8% to risk-free customers. Say, historical observation indicates that there is an average loss of 2% would occur

on Level 2 accounts. This loss is the cost associated with such risk. This is to be factored into in pricing. The intention is to defray the possible losses across similar transactions. In this case, risk premium of 2% may be added in pricing and loans may be offered at 10% instead of 8%

#### 4.2.5 Risk Monitoring and Control

The approach to risk management centers on facilitating implementation of risk and business policies simultaneously in a consistent manner. Most banks have following in place to manage risks

1. An organizational structure as in there should be proper committees to consider risks
2. Comprehensive risk measurement approach.
3. Risk Management Policies adopted at the corporate level should be consistent with the broader business strategies, capital strength, management expertise and risk appetite.
4. There should be proper guidelines and other parameters used to govern risk taking including detailed structure of prudential limits, discretionary limits and risk-taking functions

#### 4.2.6 Risk Mitigation

The techniques to mitigate diverse types of risk are different. For **mitigating credit risk banks** have been using traditional techniques, such as collateralizations by priority claims, third party guarantees, etc. Banks may buy credit derivatives to offset various forms of credit risk. For mitigating **interest rate risk** banks use interest rate swaps, forward rate agreements or financial Futures. Similarly, for mitigating forex risks banks use forex forward contracts, forex options or futures and for mitigating equity price risk, equity options

**Risk mitigation measures aim to reduce downside variability in net cash flow, but it also reduces upside potential simultaneously.** In fact, risk mitigation measures reduce the variability in net cash flow. In addition, **risk mitigation would involve counterparty and it will always be associated with counter-party risk.**

### 4.3 Camels Framework

The CAMELS rating system is a recognized international rating system that bank supervisory authorities use to rate financial institutions according to six factors represented by the acronym "CAMELS." Supervisory authorities assign each bank a score on a scale, and a rating of one is considered the best and the rating of five is considered the worst for each factor. The six factors in Camel's framework are

Factor	Explanation
C- Capital Adequacy	Examiners assess institutions' capital adequacy through capital trend analysis.
A – Asset Quality	It determines the quality of loan's given by the bank. Loan given to people who are not financially sound may be defaulted by them.
M- Management	Management assessment determines whether an institution is able to properly react to financial stress. This component rating is reflected by the

	management's capability to point out, measure, look after, and control risks of the institution's daily activities.
E- Earnings	An institution's ability to create appropriate returns to be able to expand, retain competitiveness, and add capital is a key factor in rating its continued viability.
L- Liquidity	To assess a company's liquidity, examiners look at interest rate risk sensitivity, availability of assets which can easily be converted to cash, dependence on short-term volatile financial resources
S- Sensitivity	Sensitivity covers how particular risk exposures can affect institutions. Examiners assess an institution's sensitivity to market risk

## 4.4 Basel Norms

At the end of 1974, the **Central Bank Governors** of the Group of Ten countries formed a committee of banking supervisory authorities. As this Committee usually meets at the Bank of International Settlement (**BIS**) in Basel, Switzerland, this Committee came to be known as the **Basel Committee on Banking Supervision**.

The Basel committee has introduced three Basel Norms which are known as **Basel Accord**. These Basel Norms are called **Basel 1, Basel 2, and Basel 3**.

### 4.4.1 Basel 1

Basel I mainly catered to the **credit risk** that the risk of borrowers defaulting on Loans/Bonds/debt etc.

Basel1 defines **CRAR Ratio** = (Tier 1 Capital + Tier 2 Capital)/Risk Weighted Assets of Credit Risk

**Tier 1** include (equity capital plus disclosed reserves minus goodwill)

**Tier 2** includes (asset revaluation reserves, undisclosed reserves, general loan loss reserves, hybrid capital instrument and subordinated term debt).

**CRAR** is **minimum capital requirement to risk weighted Asset ratio**

**Note:** You will understand Tier1 and tier 2 better after learning balance sheets in case you have not read them till now

The denominator of the Basel I formula is the sum of risk-adjusted assets. There are five credit risk weights: 0 per cent, 10 per cent, 20 per cent, 50 per cent and 100 per cent.

1. Risk weight would be 0 % for government or central bank claims
2. 20 % for Organization for Economic Cooperation and Development (OECD) inter-bank claims
3. 50 % for residential mortgages
4. 100 % for all commercial and consumer loans.

As per Basel I norms the minimum capital ratio should be **8%**. India RBI recommends it to be **9%**. So, any bank in India having capital ratio of less than **9%** is deemed to be risky

**In 1996 an amendment** was made to the Basel 1 rules and along with **credit risk, market risk** was also included while determining the riskiness of a bank. So, the formula to calculate minimum capital became

CRAR Ratio (8%) = Capital/ (RWA's for Credit Risk + RWA's for Market Risk)

#### 4.4.2 Basel 2

Basel 2 norms has 3 pillars

- Pillar 1 - Minimum capital requirements
- Pillar 2 - Supervisory review process
- Pillar 3 - Market discipline

The min. capital ratio remains the same i.e., 9% as in Basel 1

However, the significant changes are

1. Along with **Credit Risk** and Market Risk, Basle 2 also consider **Operational Risk** while calculating the minimum capital (The detailed formula is not needed for the exam)
2. **The major change is that RWA** (risk weighted in the assets) which is the denominator while calculating capital ratio is now calculated differently. In Basel 1 an asset was always given a percentage like all Consumer loans were thought to be 100% risky but in Basel2 for each type of asset there is a rating-based risk weightage. So, if a Consumer loan has rating 1 (good rating) then its risk weightage would be around 50% but if it has a rating of 5 (worst rating) then its risk weightage would be 100% or may be more.

**Note:** Capital requirement under Basel II does not include liquidity risk, interest rate risk of banking book, strategic and business risks. These risks would be under 'Supervisory Review Process', if supervisors feel that the capital held by a bank is not sufficient, they could require the bank to reduce its risk or increase its capital or both

##### 4.4.2.1 Pillar 1 – Minimum Capital Requirements

Basel 1 Accord and the 1996 amendment thereto has defined capital requirement as

CRAR Ratio (8%) = Capital/ (RWA's for Credit Risk + RWA's for Market Risk)

The Revised Capital Accord or Basel II defines the capital requirement as

CRAR Ratio (8%) = Capital/ (RWA's for Credit Risk + RWA's for Market Risk+ RWA's for Operational Risk)

It is to be noted that there is no change –

- In the definition of capital
- In the minimum capital ratio, which remains 8%
- In the calculation of market risk and it remains as per 1996 Amendment

The changes are in

- Method of calculating risk in credit exposures
- By way of capital charge on operational risk

Please note that in India RBI recommends it to be **9%** and not **8%**.

CRAR Ratio (9%) = Capital/ (RWA's for Credit Risk + RWA's for Market Risk+ RWA's for Operational Risk)

## How to Calculate the Capital Charge for Credit Risk, Market Risk and Operational Risk?

There are various methods for calculating minimum capital for different Risks

### Capital Charge for Credit Risk Methods

1. **Standardized Approach:** The standardized approach puts different exposures such as loan to government, loan to other bank or loan to Company or a consumer in different risk categories. It makes use of **external assessments** to assign different risks with in a category based on their rating. It is same as we discussed on the previous page
2. **Internal Ratings Based (IRB) Foundation Approach:** Read next point
3. **Internal Ratings Based (IRB) Advanced Approach:** The IRB Approach offers the following two options: **Foundation IRB Approach (FIRB) and Advances IRB Approach (AIRB) version**. The IRB approach differs substantially from the standardized approach to the extent **that banks' internal assessments** of key risk parameters serve as primary inputs to capital calculation. The salient features of IRB Approach are as under:
  1. The IRB Approach computes the **capital charge** requirements of each exposure directly before computing the risk-weighted assets.
  2. The risk-weighted assets are derived from the capital charge computation.
  3. Capital charge computation is a function of the following parameters:

- a. **Probability of default (PD)**, which measures the likelihood that the borrower will default over a given time horizon
  - b. **Loss given default (LDG)**, which measures the proportion of the exposure that will be lost if a default occurs
  - c. **Exposure at default (EAD)**, which for loan commitment measures the amount of the facility that is likely to be drawn in the event of a default.
  - d. **Maturity (M)**, which measures the remaining economic maturity of the exposure.
4. The basic difference between Advanced IRB and Foundation IRB is listed below depending upon who provides inputs for parameters during determination of risk

Parameter	Foundation IRB	Advanced IRB
PD	Bank	Bank
LGD	Supervisor	Bank
EAD	Supervisor	Bank
M	Bank or Supervisor	Bank
Risk Weight	Function Provided by Committee	Function provided by Committee
Data Requirements	Historical data of 5 years for PD	Historical data of 7 years to estimate LGD and 7 years to calculate EAD plus data for PD estimation

### Capital Charge for Market Risk Methods

1. Standardized Approach (Maturity Method)
2. Standardized Approach (Duration Method)
3. Internal Models Method

We need not go into details of these approaches as of now. But in all three methods first the capital charge is calculated and then from capital charge the RWA's for Market Risk are calculated

### Capital for Operational Risk Methods

Operational risk is an important risk faced by banks and according to BCBS banks need to hold capital to protect against losses from this. This is a new area where the Committee has developed a regulatory capital approach. As in the case of credit risk, the committee has reckoned banks' rapidly developing internal assessment techniques and seeks to provide incentives to banks for improving upon those techniques, and more broadly, banks'

management of operational risk over a period. As in credit risk, three alternate approaches are prescribed

1. Basic Indicator Approach
2. Standardized Approach
3. Advanced Measurement Approach

The below table captures the provisions of the proposed accord across different approaches

	<b>Basic Indicator</b>	<b>Standardized</b>	<b>AMA</b>
Computation of Capital Charge	15% of average gross income over three years	<p>Average gross income segregated into eight business lines, viz., retail banking, retail brokerage and asset management, which carry capital charge of 12%; commercial banking and agency services attract 15%; corporate finance, trading and sales and payment and settlement carry charge of 18%.</p> <p>Total capital charge is the sum of capital charges across business lines.</p>	<p>Capital charge equals internally generated measure based on:</p> <ul style="list-style-type: none"> <li>• Internal loss data</li> <li>• External loss data</li> <li>• Scenario analysis</li> <li>• Business environment and internal control factors</li> </ul>
Qualifying Criteria	None	Existence of Sound Operational Risk Management System	Minimum 5 years loss data

In operational Risk also the RWA's for Operational risk are calculated from the capital charge calculated

#### **4.4.2.2 Pillar 2 – Supervisory review process**

Pillar 2 of the new capital framework recognizes the necessity of exercising effective supervisory review of banks' internal assessments of their overall risks to ensure that bank management is exercising sound judgment and had set aside adequate capital for these risks.

Supervisors will personally go to the banks and evaluate the activities and risk profiles of individual banks to determine whether those organizations should hold higher levels of capital than the minimum requirements in Pillar 1.

This process also considers other risks such as **interest rate risk, Liquidity Risk, Settlement Risk, Strategic Risk etc.** which are not considered in capital ratio calculation.

An important outcome of pillar 2 is **ICAAP**. It stands for **Internal Capital Adequacy Process**. It is an umbrella activity that encompasses the governance, management and control of all risk and capital management functions and the linkages therein. It strengthens the governance and organizational effectiveness around risk and capital management.

This is more of a human intervention in the process. Sometimes banks are able to maintain Capital ratio by finding some loopholes but with supervisory process they would not be able to do so

#### **4.4.2.3 Pillar 3 – Market discipline**

This pillar is about effective management such as degree of transparency in banks' public reporting. Thus, adequate **disclosure of information** to public in **timely manner** brings in market discipline and, in the process, promotes safety and soundness in the financial system.

#### **4.4.2.4 Numerical**

The following example will clarify how do we calculate the CRAR ratio by using RWA's of Credit Risk, Market Risk and Operational Risk

**Numerical:** You are given the below information. Calculate the CRAR

Tier 1 Capital = 1000 Crores

Tier 2 Capital = 1200 Crores

RWA's for Credit Risk = 10,000 crores

Capital Charge for Market Risk = 500 crores

Capital charge for Operational Risk = 300 crores

**Solution:** We need to use this formula

$$\text{CRAR Ratio} = \text{Capital} / (\text{RWA's for Credit Risk} + \text{RWA's for Market Risk} + \text{RWA's for Operational Risk})$$

**Rule 1:** The maximum of Tier 2 Capital that can be taken into calculation is 100% of Tier 1 Capital. So here maximum Tier 2 capital would be 100% of 1000 crores = 1000 crores

So Total capital = Tier 1 + Tier 2 = 1000 + 1000 = 2000



RWA's of Credit Risk = 10,000 crores

**Rule 2:** To Convert Capital Charge into RWA's, we divide the capital charge by 0.09

RWA's Market Risk = Capital Charge for Market Risk / (.09) = 500/.09 = 5556 crores

RWA's Credit Risk = Capital Charge for Operational Risk / (.09) = 300/.09 = 3333 crores

So CRAR = 2000 / (10,000+5556+333) = 2000/ (18889) = 10.59%

#### 4.4.3 Basel 3

Basel III is intended to further strengthen the risk management at bank especially after looking into devastation caused by global financial crisis in 2008. **It was announced in 2010.**

**Major Changes that were Proposed in Basel 3 over earlier Accords – Basel 1 and Basel 2 are given below**

1. Better Quality of Capital
2. Capital Conservation Buffer
3. Countercyclical Buffer
4. Leverage Ratio
5. Liquidity Ratios
6. Systematically Important Financial Institutions (SIFIs)

Let is discuss all these points one by one

##### 4.4.3.1 Better Quality of Capital

**Capital Ratio or Min Capital Requirement:** The overall min capital ratio (Tier 1 + Tier 2) is unchanged at 8% (RBI recommends 9%) in Basel 3.

**Note:** These min. Capital Requirements are only applicable to Scheduled Commercial Banks and not to Regional Rural banks and Local Area Banks

But there are some new recommendations to ensure better quality of capital

Capital Ratio = (Tier 1 Capital + Tier 2 Capital)/Risk Weighted Assets

<b>Let's break the above formula</b>
Tier 1 Capital/RWA – minimum capital ratio is 6% (Also called Tier 1 Capital Ratio)
Tier 2 Capital/RWA – Max Capital ratio is 2% (Also called Tier 2 Capital Ratio)
So, Min. Tier1 Capital ratio be 6%. In India recommends min of 7%
Min. overall (Tier 1 + Tier 2) Capital Ratio = 8%. In India RBI Recommends min of 9%
So, with in min. overall capital ratio of 8% (as per RBI 9%), Tier 2 Capital ratio can be max. of 2%

### Tier 1 capital is further divided in two parts

Tier 1 Capital /RWA= Common Equity Tier 1 (CET1)/RWA + Additional Tier 1(AT 1)/RWA

6% = 4.5 % + 1.5%

I.e., Minimum of CET 1 capital ratio be **4.5 %**. (Also called Tier1 **Common Capital Ratio**). **RBI Recommends CET 1 to be 5.5% instead of 4.5%**

With in min Tier 1 Capital Ratio of 6%, the AT 1 Capital Ratio can be max of 1.5%

**CET1** capital includes equity instruments that have discretionary dividends and no maturity

**AT 1 Capital** is the money borrowed by company from lenders who expect to get their money back and expect interest each year till maturity. But if bank goes into losses, then debt is converted into equity i.e., lenders are issued shares of the bank and no money is returned to them. So, it's a way of restructuring debt. These are also called Coco bonds or contingent convertible bonds. These bonds can also be cancelled any time

### Table Summarizing the above discussion

	<u>Regulatory Capital</u>	<u>Globally as % of RWA</u>	<u>As per RBI as % of RWA</u>
<b>A</b>	Min Common Equity Tier 1 Capital	<b>4.5</b>	<b>5.5</b>
<b>B</b>	AT 1 Capital	<b>1.5</b>	<b>1.5</b>
<b>C = A+B</b>	Min. Tier 1 Capital	<b>6</b>	<b>7</b>
<b>D</b>	Tier 2 Capital	<b>2</b>	<b>2</b>
<b>E = C+D</b>	Min. Overall Capital Ratio	<b>8</b>	<b>9</b>

#### **4.4.3.2 Capital Conservation Buffer**

Another key feature of Basel 3 is that now banks will be required to have a capital conservation buffer of **2.5%**. The main aim of capital conservation buffer is to ensure that banks build up capital buffers during normal times that is outside periods of stress which can be drawn down as losses are incurred during the stressed. The capital conservation buffer can be withdrawn only when a bank faces a systemic stress. A bank shall not use this capital conservation buffer in normal times and doing so will be seen as serious breach.

#### Details of Capital Conservation Buffer

**Banks would be required to build this capital conservation buffer of 2.5% which will comprise of Common Equity Tier 1 Capital.** This would be over and above the regulatory min capital ratio of 9% as recommended by RBI. **So, the overall min. capital Ratio including this capital conservation buffer will become 9 + 2.5 % = 11.5% as per RBI standards.**

### Implementation of this Capital Conservation Buffer

The Inclusion of capital conservation buffer was to be implemented in phased manner where each year a certain part of capital conservation buffer was to be implemented. Starting 2016, each year .625% of the total 2.5% of CCB was to be implemented. **But this phased implementation is still not complete.** There are many reasons for delayed implementation and one of the major reasons being Covid 19. As of now only 1.875 % of CCB has been implemented by RBI as a regulatory measure and last tranche of .625% is still to be implemented

### Constraints/Penalties on Banks in case of non-binding on this Capital Conservation Buffer

In case the level of capital (**CET 1 + CCB**) falls below the required level **of 8%**, constraints will be imposed on distribution of its earnings such as restrictions on paying dividends, Buybacks or Bonus to shareholders. The below table shows the details of how the constraints will be imposed in case the total CET 1 Capital (including conservation buffer) comes below 8%

<b>CET 1 Ratio of the bank</b>	<b>Min. Earnings to Be conserved</b>
5.5% to 6.125%	100%
>6.125% to 6.75%	80%
>6.75% to 7.375%	60%
>7.375% to 8%	40%
>8%	0%

#### **4.4.3.3 Countercyclical Buffer**

Counter Cyclical Capital Buffers (CCCB) are the Buffers which are maintained in opposition to the cycle of the credit growth cycles. In good times bank saves money in the CCCB and in tough times bank takes out money from CCCB and lend it to the outside world. They are a mechanism of Risk Management

The CCCB may be maintained in the form of Common Equity Tier 1 (CET 1) capital or other fully loss absorbing capital only, and the amount of the CCCB may vary from **0 to 2.5%** of total risk weighted assets (RWA) of the banks. **It would be RBI who will decide whether CCCB needs to be maintained and if yes then how much with in a range of 0-2.5%.** RBI will consider **credit to GDP ratio as the main indicator** to decide whether to implement CCCB but credit to GDP ratio shall not be the only reference point rather it should be using in conjunction with many other indicators such as GNPA growth.

**Important Note: CCCB is different from Capital conservation buffer. CCCB is not to be always maintained like CCB. RBI would decide from time to time whether CCCB needs to be maintained and if yes then how much?**

If CCCB is also implemented, then assuming CCCB as 2.5% the min Capital ratio (tier 1 + tier 2) would become 14% (9% + 2.5% (CCB) + 2.5% (CCCB) ) as per RBI regulations.

#### 4.4.3.4 Leverage Ratio

**Leverage Ratio:** Basel III introduced a minimum "leverage ratio". This is a non-risk-based leverage ratio and is calculated by dividing Tier 1 capital by the bank's average total consolidated assets (sum of the exposures of all assets and non-balance sheet items). The banks are expected to maintain a leverage ratio more than 3% under Basel III

$$\text{Tier1 Capital} / \text{Total Exposure} \geq 3\%$$

In India, RBI recommends leverage ratio of 4% for **Systematically Important banks (SIBs)** and 3.5% for other banks. **Leverage ratio is higher for SIBs so that they are forced to have higher amount of Tier 1 capital which is a quality capital**

#### 4.4.3.5 Liquidity Ratio

Under Basel III, framework for liquidity management has been created. Two new ratios have been prescribed as discussed below

1. **Liquidity Coverage Ratio:** The "Liquidity Coverage Ratio" was supposed to require a bank to hold sufficient high-quality liquid assets to cover its total net cash outflows over 30 days. Mathematically it is expressed as follows:

$\text{LCR} = \text{High Quality Assets} / \text{Net Liquidity outflow over 30 days}$

LCR must be  $\geq 100\%$  as per RBI regulations in India w.e.f Jan 1, 2019

LCR has been reduced sometimes below 100% in between such as during covid but it was more of a temporary measure and the long-term target is 100% only

2. **Net Stable Funding Ratio:** Though LCR ratio discussed above takes care of shorter-term stability, NSFR takes care of longer-term stability. **NSFR must be above 100% as per guidelines but its implementation has been delayed as RBI has been giving relaxations due to one reason or the other.**

#### 4.4.3.6 Systematic Important Financial Institution

Some banks, due to their size, cross-jurisdictional activities, complexity, lack of substitutability and interconnectedness, become systemically important. The health of these banks is important for the economy as the failure of these banks can lead to failure of the whole banking system as banks are inter-connected with each other

For these banks, Basel III recommends more stringent regulations than what are prescribed in Basel III. It is left for central banks to decide that. For example, In India RBI has prescribed

Leverage ratio of 4% for Domestically systematically important banks whereas for normal banks the leverage ratio is 3.5%

#### 4.5 PCA Framework

This is covered in Current Affairs FM section. There was a detailed notification by RBI on this

### 5 Some Important Terms

1. **Risk Premium:** A risk premium is the **return in excess** of the risk-free rate of return an investment is expected to yield; an asset's risk premium is a form of compensation for investors who tolerate the extra risk, compared to that of a risk-free asset, in a given investment.
2. **Risk Return Trade off:** The **risk-return tradeoff** is the principle that potential return rises with an increase in risk. Low levels of uncertainty or risk are associated with low potential returns, whereas high levels of uncertainty or risk are associated with high potential returns.

### 6 Beta of an Investment or an Asset

In finance, the **beta ( $\beta$  or beta coefficient)** of an investment indicates whether the investment is more or less volatile than the market. In general, a beta less than 1 indicates that the investment is less volatile than the market, while a beta more than 1 indicates that the investment is more volatile than the market.

**A beta below 1 can indicate two things**

1. **If beta is between 0 and 1** then the investment is **less volatile** than the market. **An example** of the first is a **treasury bill**: the price does not go up or down a lot even when the market moves, so it has a low beta
2. **If beta is less than 0 i.e. Negative Beta** then it means volatile investment whose price movements are not correlated with the market. A negative beta correlation would mean an investment that moves in the opposite direction from the stock market. When the market rises, then a negative-beta investment generally falls. When the market falls, then the negative-beta investment will tend to rise. This is generally true of gold stocks and gold bullion

#### 6.1 CAPM Model

CAPM stands for Capital Asset Pricing Model

Whenever an investment is made, for example in the shares of a company listed on a stock market, there is a risk that the actual return on the investment will be different from the

expected return. Investors take the risk of an investment into account when deciding on the return they wish to receive for making the investment. The CAPM is a method of calculating the return required on an investment, based on an assessment of its risk.

### **SYSTEMATIC AND UNSYSTEMATIC RISK**

If an investor has a portfolio of investments in the shares of a few different companies, it might be thought that the risk of the portfolio would be the average of the risks of the individual investments. In fact, it has been found that the risk of the portfolio is less than the average of the risks of the individual investments. By diversifying investments in a portfolio, therefore, an investor can reduce the overall level of risk faced.

There is a limit to this risk reduction effect, however, so that even a 'fully diversified' portfolio will not eliminate risk entirely. The risk which cannot be eliminated by portfolio diversification is called 'undiversifiable risk' or 'systematic risk', since it is the risk that is associated with the financial system. The risk which can be eliminated by portfolio diversification is called 'diversifiable risk', 'unsystematic risk', or 'specific risk', since it is the risk that is associated with individual companies and the shares they have issued.

### **THE CAPITAL ASSET PRICING MODEL**

The CAPM assumes that investors hold fully diversified portfolios. This means that investors are assumed by the CAPM to want a return on an investment based on its systematic risk alone, rather than on its total risk. The measure of risk used in the CAPM, which is called 'beta', is therefore a measure of systematic risk.

The formula for the CAPM is as follows:

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f)$$

$E(r_i)$  = return required on financial asset  $i$

$R_f$  = risk-free rate of return

$\beta_i$  = beta value for financial asset  $i$

$E(r_m)$  = average return on the capital market

This formula expresses the required return on a financial asset as the sum of the risk-free rate of return and a risk premium:  $\beta_i (E(r_m) - R_f)$  – which compensates the investor for the systematic risk of the financial asset.

### **THE RISK-FREE RATE OF RETURN**

In the real world, there is no such thing as a risk-free asset. Short-term government debt is a relatively safe investment, however, and in practice, it can be used as an acceptable substitute for the risk-free asset.

In order to have consistency of data, the yield on treasury bills is used as a substitute for the risk-free rate of return when applying the CAPM to assets that are traded on the capital market. Note that it is the yield on treasury bills which is used here, rather than the interest rate.

### **THE RISK PREMIUM**

Rather than finding the average return on the capital market,  $E(r_m)$ , research has concentrated on finding an appropriate value for  $(E(r_m) - R_f)$ , which is the difference between the average return on the capital market and the risk-free rate of return. This difference is called the risk premium, since it represents the extra return required for investing in risky assets rather than investing in risk-free assets.

### **BETA**

Beta is an indirect measure which compares the systematic risk associated with a company's shares with the systematic risk of the capital market as a whole. If the beta value of a company's shares is 1, the systematic risk associated with the shares is the same as the systematic risk of the capital market as a whole.

Beta can also be described as 'an index of responsiveness of the returns on a company's shares compared to the returns on the market as a whole'. For example, if a share has a beta value of 1, the return on the share will increase by 10% if the return on the capital market as a whole increases by 10%. If a share has a beta value of 0.5, the return on the share will increase by 5% if the return on the capital market increases by 10%, and so on.

Although the concepts of the CAPM can appear complex, the application of the model is straightforward

### **Numerical**

#### **Calculating the Required Return using the CAPM**

Consider the following information:

Risk-free rate of return = 4%

Equity risk premium = 5%

Beta value of RD Co = 1.2

**Solution:**

Using the CAPM:

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f) = 4 + (1.2 \times 5) = 10\%$$

The CAPM predicts that the cost of equity of RD Co is 10%. The same answer would have been found if the information had given the return on the market as 9%, rather than giving the equity risk premium as 5%.

## 7 Systematic and Systemic Risk

In the above sections we discussed about systematic risk. Systematic risk is the one which cannot be diversified. There is another risk also by the name **Systemic Risk**. Please do not confuse Systemic Risk with Systematic Risk. Both are different

Systemic Risk is one in which there is risk of failure of the whole banking system. Individual Bank's failure is one of the major sources of the systemic risk. This happens because of high interrelations that exist on the ongoing basis between banks through mutual lending and borrowing and other commitments. The failure of single bank generates a risk of failure for all the banks that have ongoing commitments with the defaulting bank. Receivables from the failed bank become non-available putting the counterparty bank into cash or fund crunch. Because of this ripple effect, all other banks can get impacted triggering off a systemic risk