BANK FINANCIAL MANAGEMENT (CAIIB Paper 2)

Risk Management (Module B) Syllabus


Unit 2- Risk Monitoring and Control - Risk Reporting - Market Risk identification, Measurement and management/ credit risk - rating methodology, risk weights, eligible collateral for mitigation, guarantees; credit ratings, transition matrices, default probabilities, Credit risk spreads, risk migration and credit metrics, Counterparty risk.

Unit 3- Credit exposures, recovery rates, risk mitigation techniques, -/ Operational and integrated Risk Management - Risk management and capital Management – ‘Basel Norms - Current guidelines on risk management.

Meaning of Risk:
Risk is defined as an event having adverse impact on profitability and/or reputation due to several distinct sources of uncertainty. It is necessary that the managerial process captures both the uncertainty and potential adverse impact on profitability and/or reputation.

Risk is a part of any business’s lexicon, and understanding and subsequently managing it is the most important concern. In banking as well, risk is inherent in the business. Given the importance of risk management, it is no wonder that it is today receiving scrutiny from the world’s top banking regulators.

Bank of International Settlements (BIS), the Federal Reserve in the United States, Bundesbank in Germany, and Reserve Bank of India have indicated their concern at the risk-taking activities of banks.

These regulatory bodies have expressed concern since not only the environment has become a lot riskier with exchange rates and interest rates being extremely volatile, but a large amount of bank capital has been spread internationally seeking returns.

Banks’ exposure to Asian and Latin American countries’ corporates is extremely high in comparison to earlier years. As currencies and corporates reel under pressure (the South Asian crisis being an example), the regulators are understandably concerned about the banks’ ability to withstand these pressures.

Add to that mix, well publicized bank collapses (Barings) as well as losses incurred on account of faulty option pricing models (NatWest Markets) it is no wonder that there has been a slew of regulations covering capital and reporting requirements.

Organizations and institutions like banks put tangible assets (such as funds, technology, processes, and people) and intangible assets such as reputation, brand and information at risk to achieve their objectives.

Whether the organization is for-profit, or not-for-profit the task of management is to manage these risks in the uncertain environment. Organizational management has thus become synonymous with risk management.

**The Concept of Risk:**

Risk-taking comes naturally to banks. Banks engage themselves in the process of financial intermediation by taking risks to earn more than what they pay to the depositors. Risk is an event or injury that can cause damage to an institution’s income and/or reputation. It is like energy that cannot be created or destroyed but can only be passed on or managed.

There is a direct relationship between risk and reward and the quest for profit maximization has given rise to accelerated risk-taking for enhanced rewards. Whatever
be the type of risk, the impact is primarily financial. Ultimately risk manifests in the form of loss of income and reputation.

Each bank as well as every banker needs to understand and appreciate that risk is unavoidable. The existence and quantum of risk associated with each transaction cannot be ascertained with certainty.

Whatever models have been developed for risk man-agement, are primarily on the basis of observed occurrences of the past, which may or may not be repeated in future. Risk is inherent to business. Since it cannot be eliminated, it has to be managed.

**Characteristics of Risk:**

1. **A probability or threat of damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action.**

2. **Finance:** The probability that an actual return on an investment will be lower than the expected return. Financial risk is divided into the following categories: Basic risk, Capital risk, Country risk, Default risk, Delivery risk, Economic risk, Exchange rate risk, Interest rate risk, Liquidity risk, Operations risk, Payment system risk, Political risk, Refinancing risk, Reinvestment risk, Settlement risk, Sovereign risk, and Underwriting risk.

3. **Food industry:** The possibility that due to a certain hazard in food there will be an negative effect to a certain magnitude.

4. **Insurance:** A situation where the probability of a variable (such as burning down of a building) is known but when a mode of occurrence or the actual value of the occurrence (whether the fire will occur at a particular property) is not.

A risk is not an uncertainty (where neither the probability nor the mode of occurrence is known), a peril (cause of loss), or a hazard (something that makes the occurrence of a peril more likely or more severe).

5. **Securities trading:** The probability of a loss or drop in value. Trading risk is divided into two general categories: (1) Systemic risk affects all securities in the same class and is linked to the overall capital-market system and therefore cannot be eliminated by diversification. Also called market risk. (2) Nonsystematic risk is any risk that isn’t market-related or is not systemic. Also called nonmarket risk, extra-market risk, or unsystemic risk.

6. **Workplace:** Product of the consequence and probability of a hazardous event or phenomenon.
For example, the risk of developing cancer is estimated as the incremental probability of developing cancer over a lifetime as a result of exposure to potential carcinogens (cancer-causing substances).

The Changing Forms of Risk:

Risk is associated with every business activity. It is more prominent and pronounced in respect of financial sector in general and banks in particular. In a repressed financial system risk is not apparent. Risk management in such a situation may not be well organized. With globalization, the unorganized efforts towards risk management have now been substituted by systematic and formal policy endeavours.

New concepts like ‘anticipate/prevent/monitor mitigate’ have substituted the earlier ethos of ‘inspect/detect/react’. The emphasis is now more on processes and not on people alone. The changed scenario for risk management has thrown up many challenges for banks. In this background it would be interesting to understand various types of risk in a banking environment.

Risk in Banks

Types of Risks in Banks

Broadly speaking, Risks in the Banking sector are of two types namely Systematic Risks and Unsystematic Risks. Lets us define these two types of risks in Banks and understand the concept behind them.

Systematic Risks:

- It is the risk inherent to the entire market or say a market segment, and it can affect a large number of assets.
- Systematic risk is also known as Undiversifiable Risk or Volatility and market risk.
- Systematic risk affects the overall market and not just a stock or industry in particular.
- This type of risk is both unpredictable and impossible to avoid completely.
- Examples of it include interest rate changes, inflation, recessions and wars.

Unsystematic Risks:

- It is the risk that affects a very small number of assets.
- It is also called Nonsystematic Risk, Specific Risk, Diversifiable Risk and Residual Risk.
- This type of risk refers to the uncertainty inherent to a company or industry investment in particular.
• Examples include a change in management, a product recall, a regulatory change that could drive down company sales and a new competitor in the marketplace with the potential to take away market share from a company in which you’ve invested.
• It is possible to avoid Unsystematic Risks through diversification.

Credit of Default Risk:

It is the risk in which a borrower is unable to pay the interest or principal on its debt obligations. The Basel Committee on Banking Supervision defines credit risk as the potential that a bank borrower, or counter-party, will fail to meet its payment obligations regarding the terms agreed with the bank. It includes both uncertainty involved in repayment of the bank’s dues and repayment of dues on time.

Market Risk:
The Basel Committee on Banking Supervision defines market risk as the risk of losses in on-balance or off-balance sheet positions that arise from movement in market prices. Market risk is the most prominent for banks present in investment banking.

The four components of market risk:

• **Interest Risk:** It causes potential losses due to movements in interest rates. This risk arises because a bank’s assets usually have a significantly longer maturity than its liabilities. In banking language, management of interest rate risk is also called asset-liability management (ALM).

• **Equity Risk:** It causes potential losses due to changes in stock prices as banks accept equity against disbursing loans. Banks can accept equity as collateral for loans and purchase ownership stakes in other companies as investments from their free or investible cash. Any negative change in stock price either leads to a loss or diminution in investments’ value.

• **Commodity Risk:** It causes potential losses due to change in commodity (agricultural, industrial, energy) prices. Massive fluctuations occur in these prices due to continuous variations in demand and supply. Banks may hold them as part of their investments, and hence face losses. The commodities’ values fluctuate a great deal due to changes in demand and supply. Any bank holding them as part of an investment is exposed to commodity risk.

• **Foreign Exchange Risk:** It causes potential loss due to change in the value of the bank’s assets or liabilities resulting from exchange rate fluctuations as banks transact with their customers or other stakeholders in multiple currencies. Banks transact in foreign exchange for their customers or for the banks’ own accounts. Any adverse movement can diminish the value of the foreign currency and cause a loss to the bank.

Liquidity Risk:
It can be defined as the risk of a bank **not being able to finance its day to day operations.** Failure to manage this risk could lead to severe consequences for the bank's reputation as well as the bond pricing and ratings of the bank in the money market.

**Country Risk:**
Country risk refers to the risk that a country **won't be able to honour its financial commitments.** When a country defaults on its obligations, it can harm the performance of all other financial instruments in that country as well as other countries it has relations with. Country risk applies to stocks, bonds, mutual funds, options and futures that are issued within a particular country.

**Operational Risk:**
The Basel Committee on Banking Supervision defines operational risk as the risk of **loss resulting from inadequate or failed internal processes, people, and systems or external events.**
All banks face operational risks in their day to day operations across all their departments including treasury, credit, investment, information technology.
There are three main causes of this risk:
- Human Intervention & Error
- Failure of the IT/internal software & systems.
- Failure of Internal Processes to transmit data & information accurately

**Reputational Risk:**
Reputational risk implies the **public's loss of confidence in a bank** due to a negative perception or image that could be created with/without any evidence of wrongdoing by the bank. **Reputational value is often measured in terms of brand value.** Advertisements play a significant role in forming & maintaining the public perception, which is the key reason for banks spend millions in content marketing dollars.
Reputational risk could stem from:
- The inability of the bank to honour government/regulatory commitments
- Nonobservance of the code of conduct under corporate governance
- Mismanagement/Manipulation of customer records
- Ineffective customer service/after-sales services

**Systemic Risk:**
This risk includes a possibility of **brining down the entire financial system to a standstill.** This is caused due to a domino effect where the failure of one bank could ripple down the failure of its counter-parties/other stakeholders, which could, in turn, threaten the entire financial services industry.
Risks such as systemic risk, which the **banks have little or no control over,** can only be mitigated if banks have a strong capital base, to ensure a sound infrastructure.
Risk Management Framework

The selection and specification of security controls for a system is accomplished as part of an organization-wide information security program that involves the management of organizational risk---that is, the risk to the organization or to individuals associated with the operation of a system. The management of organizational risk is a key element in the organization's information security program and provides an effective framework for selecting the appropriate security controls for a system---the security controls necessary to protect individuals and the operations and assets of the organization.

Risk-Based Approach

The Risk Management Framework provides a process that integrates security and risk management activities into the system development life cycle. The risk-based approach to security control selection and specification considers effectiveness, efficiency, and constraints due to applicable laws, directives, Executive Orders, policies, standards, or regulations. The following activities related to managing organizational risk are paramount to an effective information security program and can be applied to both new and legacy systems within the context of the system development life cycle and the Federal Enterprise Architecture:

Prepare Step

Prepare carries out essential activities at the organization, mission and business process, and information system levels of the enterprise to help prepare the organization to manage its security and privacy risks using the Risk Management Framework.

Categorize Step

Categorize the system and the information processed, stored, and transmitted by that system based on an impact analysis.

Select Step

Select an initial set of baseline security controls for the system based on the security categorization; tailoring and supplementing the security control baseline as needed based on organization assessment of risk and local conditions.

Implement Step

Implement the security controls and document how the controls are deployed within the system and environment of operation.

See appropriate NIST publication in the publications section.
Assess Step

Assess the security controls using appropriate procedures to determine the extent to which the controls are implemented correctly, operating as intended, and producing the desired outcome with respect to meeting the security requirements for the system.

Authorize Step

Authorize system operation based upon a determination of the risk to organizational operations and assets, individuals, other organizations and the Nation resulting from the operation of the system and the decision that this risk is acceptable.

Monitor Step

Monitor and assess selected security controls in the system on an ongoing basis including assessing security control effectiveness, documenting changes to the system or environment of operation, conducting security impact analyses of the associated changes, and reporting the security state of the system to appropriate organizational officials.

What is Organizational Structure?

Organizational structure helps a company assign a hierarchy that defines roles, responsibility, and supervision. It’s the plan that outlines who reports to whom and who is responsible for what. It’s usually recorded and shared as an organizational chart that includes job titles and the reporting structure.
Structure Types

Functional

If you've had a job, you likely worked in a functional organizational structure.

The functional structure is based on an organization being divided up into smaller groups with specific tasks or roles. For example, a company could have a group working in information technology, another in marketing and another in finance.

Each department has a manager or director who answers to an executive a level up in the hierarchy who may oversee multiple departments. One such example is a director of marketing who supervises the marketing department and answers to a vice president who is in charge of the marketing, finance and IT divisions.

An advantage of this structure is employees are grouped by skill set and function, allowing them to focus their collective energies on executing their roles as a department.

One of the challenges this structure presents is a lack of inter-departmental communication, with most issues and discussions taking place at the managerial level among individual departments. For example, one department working with another on a
A project may have different expectations or details for its specific job, which could lead to issues down the road.

In addition, with groups paired by job function, there’s the possibility employees can develop “tunnel vision” — seeing the company solely through the lens of the employee’s job function.

**Divisional**

Larger companies that operate across several horizontal objectives sometimes use a divisional organizational structure.

This structure allows for much more autonomy among groups within the organization. One example of this is a company like General Electric. GE has many different divisions including aviation, transportation, currents, digital and renewable energy, among others.

Under this structure, each division essentially operates as its own company, controlling its own resources and how much money it spends on certain projects or aspects of the division.

Additionally, within this structure, divisions could also be created geographically, with a company having divisions in North America, Europe, East Asia, etc.

This type of structure offers greater flexibility to a large company with many divisions, allowing each one to operate as its own company with one or two people reporting to the
parent company’s chief executive officer or upper management staff. Instead of having all programs approved at the very top levels, those questions can be answered at the divisional level.

A downside to this type of organizational structure is that by focusing on divisions, employees working in the same function in different divisions may be unable to communicate well between divisions. This structure also raises issues with accounting practices and may have tax implications.

**Matrix structure**

A hybrid organizational structure, the matrix structure is a blend of the functional organizational structure and the projectized organizational structure.

In the matrix structure, employees may report to two or more bosses depending on the situation or project. For example, under normal functional circumstances, an engineer at a large engineering firm could work for one boss, but a new project may arise where that engineer’s expertise is needed. For the duration of that project, the employee would also report to that project’s manager, as well as his or her boss for all other daily tasks.

The matrix structure is challenging because it can be tough reporting to multiple bosses and knowing what to communicate to them. That’s why it’s very important for the employees to know their roles, responsibilities and work priorities.
Advantages of this structure is that employees can share their knowledge across the different functional divisions, allowing for better communication and understanding of each function's role. And by working across functions, employees can broaden their skills and knowledge, leading to professional growth within the company.

On the other hand, reporting to multiple managers may add confusion and conflict between managers over what should be reported. And if priorities are not clearly defined, employees, too, may get confused about their roles.

**Flatarchy**

While the previous three types of organizational structures may work for some organizations, another hybrid organizational structure may be better for startups or small companies.

Blending a functional structure and a flat structure results in a flatarchy organizational structure, which allows for more decision making among the levels of an organization and, overall, flattens out the vertical appearance of a hierarchy.

The best example of this structure within a company is if the organization has an internal incubator or innovation program. Within this system, the company can operate in an existing structure, but employees at any level are encouraged to suggest ideas and run with them, potentially creating new flat teams. Lockheed Martin, according to Forbes, was famous for its skunkworks project, which helped develop the design of a spy plane.

Google, Adobe, LinkedIn and many other companies have internal incubators where employees are encouraged to be creative and innovative in order to promote the company's overall growth.

A benefit of this system is it allows for more innovation company-wide, as well as eliminating red tape that could stall innovation in a functional structure. As for the negatives, the structure could be confusing and inconvenient if everyone involved doesn’t agree on how the structure should be organized.

**Methods for Measurement of Risk**

**Measurement of Risk: Method # 1.**

**Probability Distribution:**
As stated above, a risky proposition in a business enterprise is presumed to be with a wide range of possible outcomes for each flow in year 1 is arranged in the form of a frequency distribution. It is known as probability distribution.

The probability that a particular event will occur is a measure of its likelihood of occurrence. Probabilities normally are stated as decimal fractions normalized to 1.0 but they can also be expressed in percentage terms as in Table.

In capital budgeting, we are not faced with the problem of measuring relative frequency of known events. Rather we forecast the likelihood of future events that will affect different proposals. To do this, we make use of subjective probabilities. In contrast, objective probability is based on prior experience and the laws of chance and on which there is a general agreement. Examples are probabilities associated with the flip of a coin or the roll of a dice.

<table>
<thead>
<tr>
<th>PROBABILITY DISTRIBUTION OF CASH FLOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Flow in 1 Year</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>0.10</td>
</tr>
<tr>
<td>10.20</td>
</tr>
<tr>
<td>20.30</td>
</tr>
<tr>
<td>30.40</td>
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<tr>
<td>40.50</td>
</tr>
<tr>
<td>50.60</td>
</tr>
<tr>
<td>60.70</td>
</tr>
<tr>
<td>70.80</td>
</tr>
<tr>
<td>80.90</td>
</tr>
</tbody>
</table>

In capital budgeting, usually the forecast of annual cash flow in one single figure is made. This is the most likely or most probable outcome perceived by the forecaster for the proposal. The question that arises in this connection is how much the forecaster is confident about this outcome. Is he very certain, very uncertain or somewhere in between? This degree of uncertainty can be defined and measured in terms of the forecaster’s probability distribution.

Thus, a probability distribution consists of just a few potential outcomes, viz., an optimistic estimate, a pessimistic estimate and a most likely estimate or alternately one could make high, low and best guess estimates. An analysis is not limited to these three alternatives. Any number may be used to express the future conditions applicable to the project.
Normally, the most likely estimate represents the expected value of the variable. This is in the middle of other possibilities and has the highest probability of occurrence. Weighted arithmetic mean provides expected value. This value is constructed by multiplying each possible outcome by its associated probability and summing the products.

The following formula is used to compute the expected value of distribution:

\[ \text{Expected value} = R = \sum_{i=1}^{n} (R_i \times P_i) \]  

... (20.1)

Where,

\[ R_i \] = the return associated with each outcome

\[ P_i \] = the probability of occurrence of each outcome

\[ R \] = the expected value.

Measurement of Risk: Method # 2.

Standard Deviation as a Measure of Risk:

Probability distribution provides the basis for measuring the risk of a project. The rule set down in this connection is “the higher the probability distribution of expected future return, the smaller the risk of a given project and the vice versa.” To measure the rightness or dispersion of the probability distribution the most widely used statistical technique of standard deviation is employed.

The following steps are involved in computing standard deviation:

<table>
<thead>
<tr>
<th>Mid-point of Frequency Interval</th>
<th>Probability</th>
<th>Column (1\times2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs.</td>
<td>Rs.</td>
<td>Rs.</td>
</tr>
<tr>
<td>5</td>
<td>.01</td>
<td>0.05</td>
</tr>
<tr>
<td>10</td>
<td>.05</td>
<td>0.75</td>
</tr>
<tr>
<td>20</td>
<td>.10</td>
<td>2.50</td>
</tr>
<tr>
<td>30</td>
<td>.20</td>
<td>7.00</td>
</tr>
<tr>
<td>40</td>
<td>.28</td>
<td>12.60</td>
</tr>
<tr>
<td>50</td>
<td>.20</td>
<td>11.00</td>
</tr>
<tr>
<td>60</td>
<td>.10</td>
<td>6.50</td>
</tr>
<tr>
<td>70</td>
<td>.05</td>
<td>3.75</td>
</tr>
<tr>
<td>80</td>
<td>.01</td>
<td>0.85</td>
</tr>
<tr>
<td>Total</td>
<td>1.00</td>
<td>45.00</td>
</tr>
</tbody>
</table>

(i) Calculate the mean of expected value of the distribution.

(ii) Calculate the deviation from each possible outcome.
(iii) Square each deviation.

(iv) Multiply the squared deviations by the probability of occurrence for its related outcome.

(v) Sum all the products. This is called variance.

\[ \text{Variance} = \sigma^2 = \sum_{i=1}^{n} (R_i - \bar{R})^2 P_i \]  

... (20.2)

The standard deviation is determined by taking the square root of the variance:

\[ \sigma = \sqrt{\sum_{i=1}^{n} (R_i - \bar{R})^2 P_i} \]  

... (20.3)

The smaller the standard deviation, the higher the probability distribution and accordingly the lower the riskiness of the project.

The following illustration will explain the above concepts more clearly:

**Illustration 1:**

A company is seized with the problem of choosing one of the two investment proposals with the following probability distribution of expected cash flows in each of the next three years. Determine which project is more riskier.

<table>
<thead>
<tr>
<th>Calculation of expected value of cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Probability</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>0.10</td>
</tr>
<tr>
<td>0.20</td>
</tr>
<tr>
<td>0.40</td>
</tr>
<tr>
<td>0.20</td>
</tr>
<tr>
<td>0.10</td>
</tr>
</tbody>
</table>

**Solution:**
Thus, proposal B has significantly higher standard deviation, indicating a greater dispersion of possible outcomes. Hence, project B is riskier. The use of the standard deviation is sometimes criticized when taken by itself as a risk measure because it measures absolute variability of returns and ignores the relative size of an investment’s expected return.

A measured deviation is important for business enterprise only when compared with central tendency. For example, the possibility of a year’s return varying by Rs, 50,000 is critically significant to a very small concern. However, a large concern would gladly accept a deviation of only 50,000.

Measurement of Risk: Method # 3.
Co-efficient of Variation \( (v) = \frac{\sigma}{R} \) \hspace{1cm} \ldots (20.4)

\[
VA = \frac{387}{2,000} = 0.193
\]

\[
VB = \frac{806}{2,000} = 0.403
\]

Generally, the larger the coefficient of variation, the greater the risk. We have currently identified the second investment as carrying greater risk. Graphic presentation of two proposals is contained in figure

**Illustration 2:**
Zenith India is contemplating to invest in a project with an expected life of 3 years.

The cost of the project is Rs. 25,000 and the possible cash flows for the three years are:
Assume a risk free discount rate of 5 per cent. Calculate the expected value and standard deviation of the probability distribution of possible net present values. Assuming a normal distribution, what is the probability of the project providing a net present value at zero or less of Rs. 7,500 or more? Is the standard deviation calculated larger or smaller than it would be under an assumption of independence cash flows over time?

Solution:

Expected value of the cash flow for three years is set out as follows:

The standard deviations of the cash flows for 3 years are:

\[
\begin{align*}
\sigma_1 &= .10(0-10,000)^2 + .20(5,000-10,000)^2 + .40(10,000-10,000)^2 \\
&= .20(15,000-10,000)^2 + .10(20,000-10,000)^2 \\
&= (8,00,000)^{1/2} = 6,325 \\
\sigma_2 &= .15(2,500-17,500)^2 + .20(10,000-17,500)^2 \\
&= .30(17,500-17,500)^2 + .20(25,000-17,500)^2 \\
&= .15(32,500-17,500)^2 = (10,75,000)^{1/2} = 7,332 \\
\sigma_3 &= .15(0-7,500)^2 + .20(3,750-7,500)^2 + .30(7,500-7,500)^2 \\
&= .20(11,250-7,500)^2 + .15(15,000-7,500)^2 = (2,79,25,000)^{1/2} = 3,736.
\end{align*}
\]

The Standard deviation of the probability distribution of possible net present values under the assumption of perfect correlation of cash flows over time is given as under:
These standardized differences correspond to probabilities of approximately .32 and .48, respectively as per the normal distribution table. The standard deviation calculated under this assumption is much larger that it would be under an assumption of independence of cash flows overtime.

**What is Sensitivity**

Sensitivity is the magnitude of a financial instrument’s reaction to changes in underlying factors. Financial instruments, such as stocks and bonds, are constantly impacted by many factors. Sensitivity accounts for all factors that impact a given instrument in a negative or positive way. The objective is to learn how much a certain factor impacts the value of a particular instrument.

**BREAKING DOWN Sensitivity**

Sensitivity determines how an investment changes with fluctuations in outside factors. Stocks and bonds are especially sensitive to interest rate changes. The discount rate is an important factor in deriving the theoretical value of stocks. Also on a macro level, changes in economic growth and inflation rates are influential on the value of stocks and bonds. Sensitivity analysis is also conducted on a micro level. A company may want to know the sensitivity of its revenues to a product price change, for example.

**Bond Sensitivity**

Fixed-income investments are very sensitive to interest rate changes. A bond’s duration reflects changes in the bond’s price for each 1% fluctuation of the interest rate. For example, a bond with a duration of 4 means the bond price decreases/increases 4% for every 1% increase/decrease in interest rate. A bond with a long maturity and low coupon has a longer duration and therefore is more sensitive to rate fluctuations. Buying a bond at a low-interest rate means the bond will be less valuable when rates rise and other bond
yields are higher. This is simply because fixed-income investors will buy the higher-yielding bond, all else equal. Assets that are considered fixed income-like such as utility stocks and preferred stocks are two examples of rate-sensitive assets.

Benefits of Sensitivity Analysis

Sensitivity analysis helps determine how stock and bond valuations move with changes in key variables. An investor needs to determine how certain changes in variables will affect potential returns. Criteria for success, a set of input values, a range over which the values can move, and minimum and maximum values for variables must be preset to determine whether the desired outcome has been reached. After determining profitability forecasts, an investor can make better-educated decisions regarding where to place assets while reducing risks and potential error. Sensitivity analysis is at the heart of risk models. A wide array of modelers in the banking and insurance sectors rely on running multiple changes of variables in their models to see results of 'what-if' scenarios. Across all other corporate industries, treasury and finance departments are increasingly being required to disclose sensitivity analysis or other risk measurements in financial statements.

Basis Point Value (BPV)

A basis point is a unit of measure used in finance to describe the percentage change in the value or rate of a financial instrument.

One basis point is equivalent to 0.01% (1/100 of a percent) or 0.0001 in decimal form. If interest rates rose from 2.00% to 2.50%, it would be said that rates rose 50 basis points. In many cases, basis point refers to changes in short-term interest rates, such as Eurodollars, but it is also important with longer-term bond yields.

Basis Point Value, also known as DV01 (the dollar value of a one basis point move) represents the change in the value of an asset due to a 0.01% change in the yield.

BPV or DV01 calculations are used in many ways, but primarily to show the dollar amount of change for each increase or decrease in interest rates. If the value of the Eurodollar futures contract moves by one basis point (.01%), it would equate into a $25.00 move in the contract value. If Eurodollar futures moved four basis points or .04%, it would equate to a $100 move in the value of the contract.

Show graphic calculating this BPV or DV01 for Eurodollars:
Basis Point Value Calculation

The face value of the Eurodollar futures contract is $1,000,000. The futures track three-month Eurodollar rates (three-month LIBOR) hence we use 90 days in the equation, and .01% in decimal form is .0001.

Basis Point Value (BPV) = Face Value x (#days ÷ 360) x .01%

BPV = 1,000,000 x (90 ÷ 360) x .0001

BPV = $25.00

Example

This example shows Eurodollars in terms of the IMM Price index. Assume Eurodollar interest rates rose from 1.00% to 1.05%, this would represent a .05% or five basis point rise in Eurodollar interest rates. But remember from the prior modules that Eurodollar futures are priced off the IMM price index.

IMM price index = 100 – Eurodollar rate (or three month LIBOR)

In the example above, Eurodollars were at 1.00%. The IMM price index, therefore, would be 100 – 1.00 = 99.00. Subsequently, interest rates rose to 1.05%. The IMM price index at that point would be 100 – 1.05 = 98.95.

As you can see, interest rate prices move inversely with interest rate yields. As rates rose five basis points, the Eurodollar IMM price index declined from 99.00 to 98.95.

To find out how much that means in terms of dollar value, we have to convert basis point movement into dollar movement. This requires knowing the DV01 (dollar Value of a .01 move)

The basis point value in Eurodollar futures from our calculation above is $25.00. Therefore, a five basis point move equates to $125.00

5 basis points x $25.00/basis point = $125.00.

Downside Risk

What Is Downside Risk?
Downside risk is an estimation of a security's potential to suffer a decline in value if the market conditions change, or the amount of loss that could be sustained as a result of the decline. Depending on the measure used, downside risk explains a worst-case scenario for an investment or indicates how much the investor stands to lose.

Downside risk measures are considered one-sided tests since they do not care about the symmetric case of upside potential, but only about potential losses.

**What Does Downside Risk Tell You?**

Some investments have a finite amount of downside risk, while others have infinite risk. The purchase of a stock, for example, has a finite amount of downside risk bounded by zero; the investor can lose his entire investment. A short position in a stock, however, as accomplished through a short sale, entails unlimited downside risk since the price of the security could continue rising indefinitely.

Similarly, being a long an option—either a call or a put—has a downside limited to the price of the option's premium, while a short options position has an unlimited potential downside.

Investors, traders, and analysts use a variety of technical and fundamental metrics to estimate the likelihood that an investment's value will decline, including historical performance and standard deviation calculations. In general, many investments that have a greater potential for downside risk also have an increased potential for positive rewards.

Investors often compare the potential risks associated with a particular investment to its possible rewards. Downside risk is in contrast to upside potential, which is the likelihood that a security's value will increase.

**Example of Downside Risk: Semi-Deviation**

With investments and portfolios, a very common downside risk measure is downside deviation, which is also known as semi-deviation. This measurement is a variation of standard deviation in that it measures the deviation of only bad volatility. It measures how large the deviation in losses is. Since upside deviation is also used in the calculation of standard deviation, investment managers may be penalized for having large swings in profits. Downside deviation addresses this problem by only focusing on negative returns.

For example, assume the following 10 annual returns for an investment: 10%, 6%, -12%, 1%, -8%, -3%, 8%, 7%, -9%, -7%.

Standard deviation (σ), which measures the dispersion of data from its average, is calculated as follows:
where:

\( \bar{x} \) = Data point or observation

\( \mu \) = Data set’s average

\( N \) = Number of data points

The formula for downside deviation uses this same formula, but instead of using the average, it uses some return threshold. Often the risk-free rate is used or a hard target return. In the above example, any returns that were less than 0% were used in the downside deviation calculation.

The standard deviation for this data set is 7.69%. The downside deviation of this data set is 3.27%. Breaking out the bad volatility from the good volatility shows investors a better picture. This shows that about 40% of the total volatility is coming from negative returns. This implies that 60% of the volatility is coming from positive returns. Broken out this way, it is clear that most of the volatility of this investment is "good" volatility.

What is Value at Risk (VAR)?

Value at Risk (VAR) is a financial metric that estimates the risk of an investment. More specifically, VAR is a statistical technique used to measure the amount of potential loss that could happen in an investment portfolio over a specified period of time. Value at Risk gives the probability of losing more than a given amount in a given portfolio.

1. VaR gives one single risk measure aggregating all positions in a spot or derivatives market.

2. It is measured in the three variables—the amount of potential loss, the probability and the time frame.

3. For example VaR of 2% at 99% confidence over 5 days indicates that the portfolio value will not depreciate more than 2% over the next 5 days with 99% certainty.

4. It can be defined as a statistical technique used to measure and quantify the level of financial risk within a firm or faced by an investment portfolio over a specific time frame.
5. VaR is used by risk managers to measure and control the level of risk which is undertaken and to ensure it is within limits.

**Advantages of Value at Risk (VAR)**

**Easy to understand**

Value at Risk is a single number that indicates the extent of risk in a given portfolio. Value at Risk is measured in either price units or as a percentage. This makes the interpretation and understanding of VAR relatively simple.

**Applicability**

Value at Risk is applicable to all types of assets – bonds, shares, derivatives, currencies, etc. Thus, VAR can be easily used by different banks and financial institutions to assess the profitability and risk of different investments, and allocate risk based on VAR.

**Universal**

The Value at Risk figure is widely used, so it is an accepted standard in buying, selling or recommending assets.

**Limitations of Value at Risk**

**Large portfolios**

Calculation of Value at Risk for a portfolio not only requires one to calculate the risk and return of each asset but also the correlations between them. Thus, the greater the number or diversity of assets in a portfolio, the more difficult it is to calculate VAR.

**Difference in methods**

Different approaches to calculating VAR can lead to different results for the same portfolio.

**Assumptions**

Calculation of VAR requires one to make some assumptions and use them as inputs. If the assumptions are not valid, then neither is the VAR figure.

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**Back Testing**

Backtesting is jargon used in financial industries to refer to testing a trading strategy or predictive model using existing historic data. Backtesting can be considered a type of cross-validation applied to time series data. Backtesting seeks to estimate the performance of a strategy if it had been employed during a past period. This requires simulating past
conditions with sufficient detail, making one limitation of backtesting the need for detailed historical data. A second limitation is the inability to model strategies that would affect historic prices. Finally, backtesting, like other modeling, is limited by potential overfitting. That is, it is often possible to find a strategy that would have worked well in the past, but will not work well in the future. Despite these limitations, backtesting provides information not available when models and strategies are tested on synthetic data. Backtesting has historically been performed by large institutions and professional money managers due to the expense of obtaining and using detailed datasets. However, backtrading is increasingly used on a wider basis, and independent web-based backtesting platforms have emerged. Although the technique is widely used, it is prone to weaknesses.

Backtesting vs. Forward Performance Testing

Forward performance testing, also known as paper trading, provides traders with another set of out-of-sample data on which to evaluate a system. Forward performance testing is a simulation of actual trading and involves following the system's logic in a live market. It is also called paper trading since all trades are executed on paper only; that is, trade entries and exits are documented along with any profit or loss for the system, but no real trades are executed.

An important aspect of forward performance testing is to follow the system's logic exactly; otherwise, it becomes difficult, if not impossible, to accurately evaluate this step of the process. Traders should be honest about any trade entries and exits and avoid behavior like cherry picking trades or not including a trade on paper rationalizing that "I would have never taken that trade." If the trade would have occurred following the system's logic, it should be documented and evaluated.

The Difference Between Backtesting and Scenario Analysis

While backtesting uses actual historical data to test for fit or success, scenario analysis makes use of hypothetical data that simulates various possible outcomes. For instance, scenario analysis will simulate specific changes in the values of the portfolio's securities or key factors take place, such as a change in the interest rate. Scenario analysis is commonly used to estimate changes to a portfolio's value in response to an unfavorable event, and may be used to examine a theoretical worst-case scenario.
What is Stress Testing?

Stress testing a Non-Functional testing technique that is performed as part of performance testing. During stress testing, the system is monitored after subjecting the system to overload to ensure that the system can sustain the stress.

The recovery of the system from such phase (after stress) is very critical as it is highly likely to happen in production environment.

Reasons for conducting Stress Testing:

- It allows the test team to monitor system performance during failures.
- To verify if the system has saved the data before crashing or NOT.
- To verify if the system prints meaning error messages while crashing or did it print some random exceptions.
- To verify if unexpected failures do not cause security issues.

Stress Testing - Scenarios:

- Monitor the system behaviour when maximum number of users logged in at the same time.
- All users performing the critical operations at the same time.
• All users Accessing the same file at the same time.
• Hardware issues such as database server down or some of the servers in a server park crashed.

**Unit-2**

Risk monitoring and control is the process of identifying, analyzing, and planning for newly discovered risks and managing identified risks. Throughout the process, the risk owners track identified risks, reveal new risks, implement risk response plans, and gage the risk response plans effectiveness. The key point is throughout this phase constant monitoring and due diligence is key to the success.

**The inputs to Risk Monitoring and Control are:**

- **Risk Management Plan** - The Risk Management Plan is details how to approach and manage project risk. The plan describes the how and when for monitoring risks. Additionally the Risk Management Plan provides guidance around budgeting and timing for risk-related activities, thresholds, reporting formats, and tracking.

- **Risk Register** - The Risk Register contains the comprehensive risk listing for the project. Within this listing the key inputs into risk monitoring and control are the bought into, agreed to, realistic, and formal risk responses, the symptoms and warning signs of risk, residual and secondary risks, time and cost contingency reserves, and a watchlist of low-priority risks.

- **Approved Change Requests** – Approved change requests are the necessary adjustments to work methods, contracts, project scope, and project schedule. Changes can impact existing risk and give rise to new risk. Approved change requests are need to be reviews from the perspective of whether they will affect risk ratings and responses of existing risks, and or if a new risks is a result.

- **Work Performance Information** – Work performance information is the status of the scheduled activities being performed to accomplish the project work. When comparing the scheduled activities to the baseline, it is easy to determine whether contingency plans need to be put into place to bring the project back in line with the baseline budget and schedule. By reviewing work performance information, one can identify if trigger events have occurred, if new risk are appearing on the radar, or if identified risks are dropping from the radar.
Performance Reports - Performance reports paint a picture of the project’s performance with respect to cost, scope, schedule, resources, quality, and risk. Comparing actual performance against baseline plans may unveil risks which may cause problems in the future. Performance reports use bar charts, S-curves, tables, and histograms, to organize and summarize information such as earned value analysis and project work progress.

All of these inputs help the project manager to monitoring risks and assure a successful project.

Once the risk owner has gathered together all of the inputs, it is time to engage in risk monitoring and controlling. The best practices provided by PMI are:

Risk Reassessment - Risk reassessment is normally addressed at the status meetings. Throughout the project, the risk picture fluctuates: New risks arise, identified risks change, and some risks may simply disappear. To assure team members remain aware of changes in the risk picture, risks are reassessed on a regularly scheduled basis. Reassessing risks enables risk owners and the project manager to evaluate whether risk probability, impact, or urgency ratings are changing; new risks are coming into play; old risks have disappeared; and if risk responses remain adequate. If a risk’s probability, impact, or urgency ratings change, or if new risks are identified, the project manager may initiate iterations of risk identification or analysis to determine the risk’s effects on the project plans.

Status Meetings - Status meetings provide a forum for team members to share their experiences and inform other team members of their progress and plans. A discussion of risk should be an agenda item at every status meeting. Open collaborative discussions allows risk owners to bring to light risks which are triggering events, whether and how well the planned responses are working, and where help might be needed. Most people find it difficult to talk about risk. However, communication will become easier with practice. To assure this is the case, the project manager must encourage open discussion with no room for negative repercussions for discussing negative events.

Risk Audits - Risk audits examine and document the effectiveness of planned risk responses and their impacts on the schedule and budget. Risk audits may be scheduled activities, documented in the Project Management Plan, or they can be triggered when thresholds are exceeded. Risk audits are often performed by risk auditors, who have specialized expertise in risk assessment and auditing techniques. To ensure objectivity, risk auditors are usually not members of the project team. Some companies even bring in outside firms to perform audits.
- **Variance and Trend Analysis** - Variance analysis examines the difference between the planned and the actual budget or schedule in order to identify unacceptable risks to the schedule, budget, quality, or scope of the project. Earned value analysis is a type of variance analysis. Trend analysis involves observing project performance over time to determine if performance is getting better or worse using a mathematical model to forecast future performance based on past results.

- **Technical Performance Measurement** - Technical performance measurement (TPM) identifies deficiencies in meeting system requirements, provide early warning of technical problems, and monitor technical risks. The success of TPM depends upon identifying the correct key performance parameters (KPPs) at the outset of the project. KPPs are factors that measure something of importance to the project and are time/cost critical. Each KPP is linked to the work breakdown structure (WBS), and a time/cost baseline may be established for it. The project manager monitors the performance of KPPs over time and identifies variances from the plan. Variances point to risks in the project’s schedule, budget, or scope.

- **Reserve Analysis** - Reserve analysis makes a comparison of the contingency reserves to the remaining amount of risk to ascertain if there is enough reserve in the pool. Contingency reserves are buffers of time, funds, or resources set aside to handle risks that arise as a project moves forward. These risks can be anticipated, such as the risks on the Risk Register. They can be unanticipated, such as events that "come out of left field." Contingency reserves are depleted over time, as risks trigger and reserves are spent to handle them. With constraints as above monitoring the level of reserves to assure the level remains adequate to cover remaining project risk, is a necessary task.

Outputs of the Risk Monitoring and Control process are produced continually, fed into a variety of other processes. In addition, outputs of the process are used to update project and organizational documents for the benefit of future project managers. The outputs of Risk Monitoring and Control are:

- **Updates to the Risk Register** – An updated Risk Register has the outcomes from risk assessments, audits, and risk reviews. In addition it is updated with the resulting outcome of the project risk and risk response. Was it a good response, did the response have the desired affect? The updated Risk Register is a key part of the historical record of risk management for the project and will be added to the historical archives.
Updates to Organizational Process Assets - Organizational process assets should be documented in light of the risk management processes to be used in future projects. Documents as the probability and impact matrix, risk databases, and lessons-learned information, as well as all of the project files are archived for the benefit of future project managers.

Updates to the Project Management Plan - Updates to the Project Management Plan occur if any approved changes have an impact on the risk management process. In addition, these authorized changes incur risks which are documented in the Risk Register.

Recommend Corrective Actions - Recommended corrective actions consist of two types: contingency plans and workaround plans. A contingency plan is a provision in the Project Management Plan that specifies how a risk will be handled if that risk occurs. The plan may be linked with money or time reserves that can be used to implement the plan. A workaround plan is a response to a negative risk that was passively accepted or not previously identified.

Recommend Preventative Actions – Recommended preventative actions assure the project follows the guidelines of the project management plan.

Requested Changes – Requested Changes are any identified changes to the project management plan. Change requests are completed and submitted to the Integrated Change Control process. All requested changes must be documented, and that approvals at the right management levels are sought and obtained.

Risk Reporting

The project managers in your organization should be tracking project risk on a regular basis. This allows them to log and respond to situations as they arise, to avoid issues before they happen. Preparing action plans that allow risks to be addressed, and then working through those plans is the core of project risk management.

But if that’s all happening at a project level, how do business leaders get an overall view of the risks across the whole project portfolio?
Risk reports are a way of communicating project and business risks to the people who need to know. Below, we explain four different types of risk reporting that enable teams to communicate risk to the right people at the right time.

1. Project Risk Reporting

Project risk reporting is at the lowest level in the project risk hierarchy. This is carried out by each project manager and the appropriate members of the project team.

Project-level reporting covers risks that are relevant to the scope of the project work, and external factors that may affect the project in some way. For example:

- The risk of price changes for key materials
- The risk of resources not being available to carry out work at the required time
- The risk of suppliers not being able to complete their contracted work.

Each project should have a risk log that documents the risks specifically related to the project. The risk log records the tasks that are being done to actively manage the risk and the owner – the person responsible for completing the action plan.

The project risk report is used by the project manager, and created with input from the project team members. All the risks will be in the risk log; only the top risks make it into the risk report as these are the ones that need management attention right now. While the risk log is likely to be in use weekly, if not more frequently, risk reporting is probably only done as part of a management reporting cycle, such as at the end of each month.

2. Program Risk Reporting

When a project is part of a program, the program manager will also have a record of relevant program-level risks.

Program-level risks are those that relate to:

- A particular project within the program where the risk is significant enough to need to be escalated to the program manager
- Overlaps or dependencies between projects within the program
- The program overall, and do not naturally link back to a specific project.
“Significant” project risk is a determination that you can work out with the project and program managers, but would typically relate to things that had a high financial, operational or strategic implication.

The program risk report is used by the program manager and created by the program team. It is produced at a frequency determined by your program management framework, which could be monthly.

3. Portfolio Risk Reporting

Portfolio-level risk reporting is a way of showing the aggregated risk profile for all the projects and programs in the portfolio.

The major risks per program (or per project, for those projects that do not form part of a program) are drawn together and presented in a way that makes it easy to see an overall summary. The report should highlight areas where management teams need to be aware, for example, where risk action plans could take two or more routes. This draws attention to the decisions that need to be taken so that program and project teams can get on with executing the work.

The portfolio risk report is created by the PMO, with data drawn from program and project risk reports. Ideally, this should be pulled directly from an enterprise project management software tool to ensure it reflects the most up-to-date information.

This report is likely to be produced monthly.

4. Business Risk Reporting

Finally, there is business-level risk reporting. Some businesses include operational activity in the scope of the portfolio, so wouldn’t have a need for this level of reporting. However, it’s common to see projects managed across the organization with a portfolio approach, and operational work falling outside that.

If this sounds like your company, a risk report that shows the aggregated risks across the portfolio isn’t the true risk profile for your business. Each business unit and function will have their own risks that relate to their operational activity. These risks can be significant.

Enterprise-wide risk reporting should focus on the most significant risks across the business. It can also include emerging risks, a competitor analysis, and current market
outlook. Generally, the more that can be displayed visually, the better. Use heat maps, charts and graphs to display information, and make the most of the automated charts that are produced by enterprise project management software tools like Primavera P6.

This report can be produced by the PMO or a different team responsible for board-level consolidation and management information. It can be produced at a frequency required by the board, which could be quarterly. It’s likely to run to over 10 pages, so it helps to have an executive summary pointing out the key concerns.

Information flowing up and down the risk reporting hierarchy should be consistent and aligned. In other words, the significant risks flow up, and management actions are clear at all levels.

A risk management maturity assessment will help your teams work out where they are in the risk reporting stakes, and what actions should be taken to embed effective risk reporting across all project teams and beyond.

**Market Risk**

**What Is Market Risk?**

Market risk is the possibility of an investor experiencing losses due to factors that affect the overall performance of the financial markets in which he or she is involved. Market risk, also called "systematic risk," cannot be eliminated through diversification, though it can be hedged against in other ways. Sources of market risk include recessions, political turmoil, changes in interest rates, natural disasters and terrorist attacks. Systematic, or market risk tends to influence the entire market at the same time.

This can be contrasted with unsystematic risk, which is unique to a specific company or industry. Also known as "nonsystematic risk," "specific risk," "diversifiable risk" or "residual risk," in the context of an investment portfolio, unsystematic risk can be reduced through diversification.

**Understanding Market Risk**
Market (systematic) risk and specific risk (unsystematic) make up the two major categories of investment risk. The most common types of market risks include interest rate risk, equity risk, currency risk and commodity risk.

Publicly traded companies in the United States are required by the Securities and Exchange Commission (SEC) to disclose how their productivity and results may be linked to the performance of the financial markets. This requirement is meant to detail a company's exposure to financial risk. For example, a company providing derivative investments or foreign exchange futures may be more exposed to financial risk than companies that do not provide these types of investments. This information helps investors and traders make decisions based on their own risk management rules.

In contrast to market risk, specific risk or "unsystematic risk" is tied directly to the performance of a particular security and can be protected against through investment diversification. One example of unsystematic risk is a company declaring bankruptcy, thereby making its stock worthless to investors.

Types of Market Risk

Interest rate risk covers the volatility that may accompany interest rate fluctuations due to fundamental factors, such as central bank announcements related to changes in monetary policy. This risk is most relevant to investments in fixed-income securities, such as bonds.

Equity risk is the risk involved in the changing prices of stock investments, and commodity risk covers the changing prices of commodities such as crude oil and corn.

Currency risk, or exchange-rate risk, arises from the change in the price of one currency in relation to another; investors or firms holding assets in another country are subject to currency risk.

Volatility and Hedging Market Risk

Market risk exists because of price changes. The standard deviation of changes in the prices of stocks, currencies or commodities is referred to as price volatility. Volatility is rated in annualized terms and may be expressed as an absolute number, such as $10, or a percentage of the initial value, such as 10%.

Investors can utilize hedging strategies to protect against volatility and market risk. Targeting specific securities, investors can buy put options to protect against a downside move, and investors who want to hedge a large portfolio of stocks can utilize index options.

Measuring Market Risk
To measure market risk, investors and analysts use the value-at-risk (VaR) method. VaR modeling is a statistical risk management method that quantifies a stock or portfolio’s potential loss as well as the probability of that potential loss occurring. While well-known and widely utilized, the VaR method requires certain assumptions that limit its precision. For example, it assumes that the makeup and content of the portfolio being measured is unchanged over a specified period. Though this may be acceptable for short-term horizons, it may provide less accurate measurements for long-term investments.

Beta is another relevant risk metric, as it measures the volatility or market risk of a security or portfolio in comparison to the market as a whole; it is used in the capital asset pricing model (CAPM) to calculate the expected return of an asset.

**What are Risk-Weighted Assets?**

Risk-weighted assets is a banking term that refers to the minimum capital that banks should keep as a reserve to reduce the risk of insolvency. Banks face the risk of loan borrowers defaulting or investments flatlining, and maintaining the minimum amount of capital helps cover the risks.

The different classes of assets held by banks carry different risk weights, and adjusting the assets by their level of risk allows banks to discount lower-risk assets. For example, assets such as debentures carry a higher risk weight than government bonds, which are considered low-risk and assigned a 0% risk weighting.

**Understanding Risk-Weighted Assets**

When calculating the risk-weighted assets of a bank, the assets are first categorized into different classes based on the level of risk and the potential of incurring a loss. The banks’ loan portfolio, along with other assets such as cash and investments, is measured to determine their riskiness. The method is preferred by the Basel Committee because it includes off-balance sheet risks. It also makes it easy to compare banks from different countries around the world.

Riskier assets such as unsecured loans carry a higher risk of default and are assigned a higher risk weight than other assets such as cash and Treasury bills. The higher the amount of risk an asset possesses, the higher the capital adequacy ratio and the capital requirements. On the other hand, Treasury bills are secured by the ability of the national government to generate revenues and are subject to fewer capital requirements than unsecured loans.

**Setting Rules for Risk Weighting**
The Basel Committee on Banking Supervision (BCBS) is the global banking regulator that sets the rules for risk weighting. The first step in banking regulation started with the publication of the Basel I framework, which set the capital requirements for banks. It was followed by the Second Basel Accord of 2004 that amended the banking regulations on the amount of capital banks should maintain against their risk exposure. Basel II recommended that banks should hold adequate capital that is at least 8% of the risk-weighted assets.

The financial crisis of 2007/08 exposed the inefficiencies that existed in the banking industry, which led to the collapse of large US banks. The main cause of the crisis was investments in sub-prime home mortgage loans that carried a higher risk of default than bank managers expected.

Following the global financial crisis, the BCBS introduced the Basel III framework, which aimed to strengthen the capital requirements of banks. It also established new requirements for funding stability and liquid assets. Basel III requires banks to group their assets by risk category so that the minimum capital requirements are matched with the risk level of each asset. The framework is scheduled to take effect on January 1, 2022.

**How to Assess Asset Risk**

When determining the risk attached to a specific asset held by a bank, regulators consider several factors. For example, when the asset being assessed is a commercial loan, the regulator will determine the loan repayment consistency and the collateral used as security for the loan.

On the other hand, when assessing a loan used to finance the construction of coastal condominiums, the assessor will consider the potential revenues from the sale (or rental) of the condos and if they are enough to repay the principal and interest payments. If the condos serve as collateral, the assessors will consider the value of the property and if it is enough to repay the loan if the debtor defaults.

If the asset being considered is a Treasury bill, the assessment will be different from a commercial loan since a treasury bill is backed by the government’s ability to continually generate revenues. The federal government has higher financial credibility, which translates to low risk to the bank. The regulator will require banks holding commercial loans on their balance sheet to maintain a higher capital, whereas banks with treasury bills and other low-risk investments will be required to maintain far less capital.

**Capital Requirements for Risk-Weighted Assets**

Capital requirements refer to the minimum capital that banks are required to hold depending on the level of risk of the assets they hold. The minimum capital requirements set by regulatory agencies such as the Federal Reserve and the Bank for International
Settlements (BIS) ensure that banks hold enough capital that is proportionate to the level of risk of the assets they hold. The capital acts as a cushion of cash when the bank incurs high operational losses in the course of the operations.

**Bank Guarantee**

A bank guarantee refers to a promise provided by a bank or any other financial institution that if a certain borrower fails to pay a loan, then the bank or the financial institution will take care of the losses. The bank will assure the original creditor through this bank guarantee that if the borrower does not meet his or her liabilities, then the bank will take care of them.

**A bank guarantee is a contract between 3 different parties and they include:**

- The applicant (the party that requests a bank guarantee from the bank and borrows from a creditor)
- The beneficiary (the party that receives a partial guarantee)
- The bank (the party that agrees to sign and assures payment in case the applicant fails to repay the loan)

Bank guarantees are very commonly utilised among business entities. With the help of a bank guarantee, the debtor or borrower or customer will be able to purchase equipment, machinery, raw materials, acquire additional funds, etc. for commercial purposes. Bank guarantees help businesses as creditors will get a proper reassurance that the loan amount will be repaid by the bank if the business is unable to repay the loan entirely on time.

When a bank signs a bank guarantee, it promises to pay any amount according to the request made by the borrower. Hence, signing a bank guarantee implies a high risk for banks.

**Understand the Process of Bank Guarantee**

- First, an applicant will ask for a loan from a beneficiary or creditor.
- While applying for the loan, these 2 parties will agree that a bank guarantee is necessary.
- Then, the applicant will request a bank to provide a bank guarantee for the loan taken from the creditor. The bank guarantee will be taken on behalf of the creditor.
- The bank will now offer the bank guarantee to the applicant and send a financial instruction to an advising bank.

**Kinds of Bank Guarantee**

**Deferred payment guarantee:** This refers to a bank guarantee or a payment guarantee that is offered to the exporter for a deferred period or for a certain time period. When a buyer purchases capital goods or machinery, the seller will give credit to the buyer when the buyer’s bank gives a guarantee that it will pay the unsettled dues of the buyer to the
seller. Under this type of guarantee, payment will be made in installments by the bank for failure in supplying raw materials, machinery or equipment. **Financial guarantee:** A financial bank guarantee assures that money will be repaid if the party does not complete a particular project or operation entirely. According to the financial guarantee agreement, when there is a delay in the completion of the project, the bank will make the payment. **Advance payment guarantee:** Under this kind of guarantee, an advance payment will be made to the seller. There will also be a guarantee that if the seller fails to deliver the service or product accurately or promptly, the buyer will receive a refund of the payment. **Foreign bank guarantee:** A foreign bank guarantee is provided by a bank on behalf of a borrower. This will be offered on behalf of the foreign beneficiary or creditor. **Performance guarantee:** Under a performance guarantee, compensation of money will be made by the bank when there is any delay in delivering the performance or operation. Payment will have to be made even if the service is delivered inadequately. **Bid bond guarantee:** Under this type of guarantee, there will be a supply bidding procedure. This will be conducted by the contractor for the owner of an infrastructure or industrial project or any kind of operation. The contractor of the project will guarantee that the best bidder or the highest bidder will have the capability and authority to implement a project as per his or her preferences. The bid bond will be given to the owner of the project as a proof of guarantee and the bond will imply that the project will have to be devised according to the bid contract.

**Comparison between Bank Guarantee and Letter of Credit**

Many times, people get confused between bank guarantee and a letter of credit. However, one should understand that both are pretty different.

A **bank guarantee** refers to a commercial or financial instrument that is provided by a bank, where the bank assures or guarantees a beneficiary that it will make the payment to the bank in case the actual customer fails to meet his or her obligations. The bank will pay on behalf of the customer who requests for a bank guarantee.

On the other hand, a **letter of credit** refers to a promise or commitment in writing made by a bank or any other financial institution or corporation to a particular seller that payment will be made to the seller if the seller completes performing whatever is mentioned in the letter of credit. For the bank to make the payment on behalf of the original buyer, there should be a documentary proof that the seller has completed the transaction accurately by delivering the right product or service on time. The seller will get a guarantee from the bank that the seller will definitely pay the amount on behalf of the original buyer once the obligations are fulfilled.

**Under a bank guarantee**, if the buyer is unable to make the payment to the seller or creditor, then the bank pays the fixed amount to the seller as the obligations of the contract are not met. On the other hand, **under a letter of credit**, the bank makes the payment to
the seller once he or she delivers. This is because the seller has completed fulfilling the required obligations.

Bank guarantees are competitively priced in nature generally. They are usually valid for a long period. The tenure of a bank guarantee is usually high. Moreover, bank guarantees are commonly accepted in almost all countries. Bank guarantees are available in Indian Rupee as well as currencies of other nations. Hence, they are very helpful for global transactions with parties in different foreign countries.

Credit Rating in India

Credit rating has garnered significant importance in the country’s financial market in the last 20 years. In simple terms, credit rating is assessing the creditworthiness of an entity. There are a number of credit agencies in the country that rate companies and organisations after measuring their ability to repay the borrowed amount.

What is Credit Rating?

Credit rating is the financial risk associated with entities such as governments, non-profit organisations, and countries, among others. The rating is given to entities by the credit rating agencies after analysing their business and finance risk. The agencies prepare a detailed report after taking into consideration some additional factors such as the ability to repay the debt.

What are credit rating agencies?

Credit rating agencies measure the likelihood of an entity turning into a defaulter. All the credit rating agencies in India are regulated by SEBI (Credit Rating Agencies) Regulations, 1999 of the Securities and Exchange Board of India Act, 1992.

Some of the top Credit Rating agencies in India

Credit Analysis and Research Ltd. (CARE), ICRA, Credit Rating Information Services of India Ltd. (CRISIL), India Rating and Research (Ind Ra), and Brick Work Rating among others are some of the top credit rating agencies in the country.

Importance of Credit Rating

When a credit rating agency upgrades a company’s rating, it suggests that the company has a high chance of repaying the credit. On the other hand, when the credit rating gets downgraded it suggests the company’s ability to repay has reduced.
Once the company’s credit rating has been downgraded, it becomes difficult for the company to borrow money. Lenders will consider such companies as high-risk borrowers as they have a higher probability of turning into a defaulter. Financial institutions will hesitate to lend money to the companies with low credit rating.

**Let’s take a look at the importance of credit rating:**

- Credit rating does a qualitative and quantitative assessment of a borrower’s creditworthiness.
- It allows investors to make a sound investment decision after taking into consideration the risk factor and past repayment behaviour. In other words, it establishes a relationship between risk and return.
- In the case of the companies, credit ratings help them improve their corporate image. It is useful especially for companies that are not popular.
- The credit rating acts as a marketing tool for companies and also as a resource that is helpful at the time of raising money. It reduces the cost of borrowing and helps in the company’s expansion.
- Lenders such as banks and financial institutions will offer loans at a lower interest rate if the entity has a higher credit rating.
- Credit rating encourages better accounting standards, detailed information disclosure, and improved financial information.

**How do credit rating agencies work in India?**

Each rating agency has its own method to calculate credit ratings. Agencies rate entities including companies, state governments, non-profit organisations, countries, securities, special purpose entities, and local governmental bodies. At the time of calculating the rating, credit rating agencies take into consideration several factors like the financial statements, level and type of debt, lending and borrowing history, ability to repay the debt, and past debts of the entity before rating them. Once a credit rating agency rates the entities, it provides additional inputs to the investor following which the investor analyses and takes a sound investment decision.

Credit ratings that are given to the entities serve as a benchmark for financial market regulations. However, it should be noted that the ratings should not be considered as advice for investors and instead should be used as a tool to make a sound decision.

**Different credit rating scales**

An individual’s creditworthiness is represented by their credit score. Similarly, a company’s creditworthiness is represented by the credit rating symbols assigned to them by the agencies. Credit rating agencies rate Non convertible debentures (NCD), company
deposits, and fixed deposits, among others. Let’s take a look at some of the credit rating symbols offered by rating agencies for long-term and mid-term debt instruments.

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<table>
<thead>
<tr>
<th>Rating Scale</th>
<th>India Ratings &amp; Research</th>
<th>CRISIL</th>
<th>BrickWork Ratings</th>
<th>CARE</th>
<th>ICRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest safety: Lowest risk of turning into a defaulter</td>
<td>IND AAA</td>
<td>CRISIL AAA</td>
<td>BWR AAA</td>
<td>CARE AAA</td>
<td>ICRA AAA</td>
</tr>
<tr>
<td>High safety: Very low credit risk</td>
<td>IND AA</td>
<td>CRISIL AA</td>
<td>BWR AA</td>
<td>CARE AA</td>
<td>ICRA AA</td>
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<tr>
<td>Low risk</td>
<td>IND A</td>
<td>CRISIL A</td>
<td>BWR A</td>
<td>CARE A</td>
<td>ICRA A</td>
</tr>
<tr>
<td>Moderate safety: moderate credit risk</td>
<td>IND BBB</td>
<td>CRISIL BBB</td>
<td>BWR BBB</td>
<td>CARE BBB</td>
<td>ICRA BBB</td>
</tr>
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</table>
### What’s the Difference Between Credit Rating and Credit Score?

A credit rating is assigned to a company or an organisation by the credit rating agencies after assessing their ability to repay the borrowed amount. Meanwhile, a credit score is computed by credit bureaus after taking into consideration several factors like credit history and repayment behaviour.

### Probability of Default

#### What is Probability of Default?
The probability of default (PD) is the probability of a borrower or debtor defaulting on loan repayments. Within financial markets, an asset’s probability of default is the probability that the asset yields no return to its holder over its lifetime and the asset price goes to zero. Investors use the probability of default to calculate the expected loss from an investment.

**Probability of Default and Credit Default Swaps**

The market’s view of an asset’s probability of default influences the asset’s price in the market. Therefore, if the market expects a specific asset to default, its price in the market will fall (everyone would be trying to sell the asset). Therefore, the market’s expectation of an asset’s probability of default can be obtained by analyzing the market for credit default swaps of the asset.

Consider an investor with a large holding of 10-year Greek government bonds. The price of a credit default swap for the 10-year Greek government bond price is 8% or 800 basis points. The investor expects the loss given default to be 90% (i.e., in case the Greek government defaults on payments, the investor will lose 90% of his assets). Therefore, the investor can figure out the market’s expectation on Greek government bonds defaulting. In this case, the probability of default is 8%/10% = 0.8 or 80%.

**What are Credit Default Swaps?**

Credit default swaps are credit derivatives that are used to hedge against the risk of default. They can be viewed as income-generating pseudo-insurance. A credit default swap is an exchange of a fixed (or variable) coupon against the payment of a loss caused by the default of a specific security.

Consider the following example: an investor holds a large number of Greek government bonds. However, due to Greece’s economic situation, the investor is worried about his exposure and the risk of the Greek government defaulting. The investor, therefore, enters into a default swap agreement with a bank. The investor will pay the bank a fixed (or...
variable – based on the exact agreement) coupon payment as long as the Greek government is solvent.

In the event of default by the Greek government, the bank will pay the investor the loss amount. A credit default swap is basically a fixed income (or variable income) instrument that allows two agents with opposing views about some other traded security to trade with each other without owning the actual security.

**Market vs. Individual Probability of Default**

Like all financial markets, the market for credit default swaps can also hold mistaken beliefs about the probability of default. For example, if the market believes that the probability of Greek government bonds defaulting is 80%, but an individual investor believes that the probability of such default is 50%, then the investor would be willing to sell CDS at a lower price than the market.

This would result in the market price of CDS dropping to reflect the individual investor’s beliefs about Greek bonds defaulting. Therefore, a strong prior belief about the probability of default can influence prices in the CDS market, which, in turn, can influence the market’s expected view of the same probability.

**What is a Credit Spread?**

A credit spread is the difference in yield between a U.S. Treasury bond and another debt security of the same maturity but different credit quality. Credit spreads between U.S. Treasuries and other bond issuances are measured in basis points, with a 1% difference in yield equal to a spread of 100 basis points. As an example, a 10-year Treasury note with a yield of 5% and a 10-year corporate bond with a yield of 7% are said to have a credit spread of 200 basis points. Credit spreads are also referred to as "bond spreads" or "default spreads." Credit spread allows a comparison between a corporate bond and a risk-free alternative.

A credit spread can also refer to an options strategy where a high premium option is written and a low premium option is bought on the same underlying security. This provides a credit to the account of the person making the two trades.

**Understanding Credit Spreads (bonds and options)**

**Credit Spread for Bonds**
A bond credit spread reflects the difference in yield between a treasury and corporate bond of the same maturity. Debt issued by the United States Treasury is used as the benchmark in the financial industry due to its risk-free status being backed by the full faith and credit of the U.S. government. US Treasury (government-issued) bonds are considered to be the closest thing to a risk-free investment, as the probability of default is almost non-existent. Investors have the utmost confidence in getting repaid.

Corporate bonds, even for the most stable and highly-rated companies, are considered to be riskier investments for which the investor demands compensation. This compensation is the credit spread. To illustrate, if a 10-year Treasury note has a yield of 2.54% while a 10-year corporate bond has a yield of 4.60%, then the corporate bond offers a spread of 206 basis points over the Treasury note.

Credit Spread (bond) = (1 – Recovery Rate) * (Default Probability)

Credit spreads vary from one security to another based on the credit rating of the issuer of the bond. Higher quality bonds, which have less chance of the issuer defaulting, can offer lower interest rates. Lower quality bonds, with a higher chance of the issuer defaulting, need to offer higher rates to attract investors to the riskier investment. Credit spreads fluctuations are commonly due to changes in economic conditions (inflation), changes in liquidity, and demand for investment within particular markets.

**For example,** when faced with uncertain to worsening economic conditions investors tend to flee to the safety of U.S. Treasuries (buying) often at the expense of corporate bonds (selling). This dynamic causes US treasury prices to rise and yields to fall while corporate bond prices fall and yields rise. The widening is reflective of investor concern. This is why credit spreads are often a good barometer of economic health - widening (bad) and narrowing (good).

There are a number of bond market indexes that investors and financial experts use to track the yields and credit spreads of different types of debt, with maturities ranging from three months to 30 years. Some of the most important indexes include High Yield and Investment Grade U.S. Corporate Debt, mortgage-backed securities, tax-exempt municipal bonds, and government bonds.

Credit spreads are larger for debt issued by emerging markets and lower-rated corporations than by government agencies and wealthier and/or stable nations. Spreads are larger for bonds with longer maturities.

**KEY TAKEAWAYS**
A credit spread reflects the difference in yield between a treasury and corporate bond of the same maturity.

Bond credit spreads are often a good barometer of economic health - widening (bad) and narrowing (good).

A credit spread can also refer to an options strategy where a high premium option is written and a low premium option is bought on the same underlying security.

A credit spread options strategy should result in a net credit, which is the maximum profit the trader can make.

### Credit Spreads as an Options Strategy

A credit spread can also refer to a type of options strategy where the trader buys and sells options of same type and expiration but with different strike prices. The premiums received should be greater than the premiums paid resulting in a net credit for the trader. The net credit is the maximum profit that trader can make. Two such strategies are the bull put spread, where the trader expects the underlying security to go up, and the bear call spread, where the trader expects the underlying security to go down.

An example of a bear call spread would be buying a January 50 call on ABC for $2, and writing a January 45 call on ABC for $5. The trader’s account nets $3 per share (with each contract representing 100 shares) as he receives the $5 premium for writing the January 45 call while paying $2 for buying the January 50 call. If the price of the underlying security is at or below $45 when the options expire then the trader has made a profit. This can also be called a "credit spread option" or a "credit risk option."
Risk mitigation is a strategy to prepare for and lessen the effects of threats faced by a data center. Comparable to risk reduction, risk mitigation takes steps to reduce the negative effects of threats and disasters on business continuity (BC). Threats that might put a business at risk include cyberattacks, weather events and other causes of physical or virtual damage to a data center.

Risk mitigation is one element of risk management, and its implementation will differ by organization. Although the principle of risk mitigation is to prepare a business for all potential risks, a proper risk mitigation plan will weigh the impact of each risk and prioritize planning around that impact. Risk mitigation focuses on the inevitability of some disasters and is used for those situations where a threat cannot be avoided entirely. Rather than planning to avoid a risk, mitigation deals with the aftermath of a disaster and the steps that can be taken prior to the event occurring to reduce adverse, and potentially long-term, effects.

One aspect of risk mitigation is prioritization -- accepting an amount of risk in one part of the organization to better protect another. By establishing an acceptable level of risk for different areas, an organization can better prepare the resources needed for business continuity while putting less mission-critical business functions on the back burner.

Ideally, an organization would be prepared for all risks and threats and avoid them entirely. However, having a risk mitigation plan can help an organization prepare for the worst, acknowledging that some degree of damage will occur and having systems in place to confront that.

**What's in a risk mitigation plan**

A risk mitigation strategy takes into account not only the priorities and mission-critical data of each organization, but any risks that might arise due to the nature of the field or geographic location. A risk mitigation strategy must also factor in an organization's employees and their needs.

When creating a risk mitigation plan, there are a few steps that are fairly standard for most organizations. Recognizing recurring risks, prioritizing risk mitigation and monitoring the established plan are vital aspects to maintaining a thorough risk mitigation strategy.

In business continuity planning, testing a plan is vital. Risk mitigation is no different. Once a plan is in place, regular testing should occur to make sure the plan is up to date. Risks facing data centers are constantly evolving, so risk mitigation plans should reflect any changes in risk or shifting priorities.
Risk mitigation vs. risk avoidance/reduction

Risk mitigation and risk avoidance are both elements of risk management, which is the overarching process of planning for and recovering from disasters. While they have similar processes and goals, there are key differences.

Risk mitigation is the process of planning for disasters and having a way to lessen the negative impact. Other elements of risk management include risk acceptance and risk transfer. Risk acceptance is accepting a risk for a given period of time to prioritize other risks. Risk transfer allocates risks between different parties, consistent with their capacity to protect against or mitigate the risk.

Risk avoidance is used when the consequences are deemed too high to justify the cost of mitigating the problem. For example, an organization can choose not to undertake certain business activities or practices to avoid any threat they might pose. Risk avoidance is a common business strategy and can range from something as simple as limiting investments to something as severe as not building offices in potential war zones.

Credit migration and credit metrics

A credit rating is a comprehensive tool for assessment of the financial strength of corporates and the Government entities. These ratings are provided by independent rating agencies like Fitch; Moody’s; and Standard & Poor’s, CARE, CRISIL, FITCH India, ICRA, Brickwork Ratings, SMERA and INFOMERICS for risk weight mapping for the long term and short term ratings. The rating provided by these rating agencies on a bond issuer indicates a level of credit quality of a bond issuer. The ratings of a company so awarded are subject to periodical change depending upon the credit risk condition of the company improves or deteriorates. Given enough historical data, the likelihood is calculated that a company at a particular rating will migrate to a different rating over some time period (say one year). This method of measuring credit risk is known as credit migration or Credit Rating Migration Risk.

Credit Metrics, is based on the analysis of credit migration, i.e., the probability of moving from one credit quality to another, including default, within a given time horizon. The most commonly used Credit Metrics is arrival of debt-to-equity ratio from the balance sheet. Other common metrics include debt/EBITDA, interest coverage, and fixed charge coverage ratios. An analyst will look at all of these credit metrics in conjunction to assess a company’s debt capacity.
Credit Metrics approach measures credit risk in a portfolio model for evaluating credit risk. This methodology is used to quantify the credit risk across a broad range of instruments, including traditional loans, commitments and letters of credit; fixed income instruments; commercial contracts like trade credits and receivables; and market-driven instruments such as swaps, forwards and other derivative. The relationships between exposure and the credit metrics framework develop a portfolio value due to credit risk. As and when a debtor's (bond issuer's) credit rating falls, the debtor’s bond cash flows become more deeply discounted and the total bond value drops accordingly. On the other hand, if a debtor's rating improves, the cash flows are discounted less deeply, and the bond values will rise.

**Counterparty risk**

What Is Counterparty Risk?

Counterparty risk is the likelihood or probability that one of those involved in a transaction might default on its contractual obligation. Counterparty risk can exist in credit, investment, and trading transactions.

Understanding Counterparty Risk

Varying degrees of counterparty risk exists in all financial transactions. Counterparty risk is also known as default risk. Default risk is the chance that companies or individuals will be unable to make the required payments on their debt obligations. Lenders and investors are exposed to default risk in virtually all forms of credit extensions. Counterparty risk is a risk that both parties should consider when evaluating a contract.

Counterparty Risk and Risk Premiums

If one party has a higher risk of default, a premium is usually attached to the transaction to compensate the other party. The premium added due to counterparty risk is called a risk premium.

In retail and commercial financial transactions, credit reports are often used by creditors to determine the counterparty's credit risk. Credit scores of borrowers are analyzed and monitored to gauge the level of risk to the creditor. A credit score is a numerical value of an individual's or company's creditworthiness, which is based on many variables.
A person’s credit score ranges from 300 to 850, and the higher the score, the more financially trustworthy a person is considered to be to the creditor. Numerical values of credit scores are listed below:

- Excellent: 750 and above
- Good: 700 to 749
- Fair: 650 to 699
- Poor: 550 to 649
- Bad: 550 and below

Many factors impact a credit score including a client’s payment history, the total amount of debt, length of credit history, and credit utilization, which is the percentage of a borrower’s total available credit that is currently being utilized. The numerical value of a borrower’s credit score reflects the level of counterparty risk to the lender or creditor. A borrower with a credit score of 750 would have low counterparty risk while a borrower with a credit score of 450 would carry high counterparty risk.

If the borrower has a low credit score, the creditor will likely charge a higher interest rate or premium due to the risk of default on the debt. Credit card companies, for example, charge interest rates in excess of 20% for those with low credit scores while simultaneously offer 0% interest for customers that have stellar credit or high credit scores. If the borrower is delinquent on payments by 60 days or more or exceeds the card’s credit limit, credit card companies usually tack on a risk premium or a "penalty rate," which can bring the interest rate of the card to over 29% annually.

**Investment Counterparty Risk**

Financial investment products such as stocks, options, bonds, and derivatives carry counterparty risk. Bonds are rated by agencies, such as Moody's and Standard and Poor's, from AAA to junk bond status to gauge the level of counterparty risk. Bonds that carry higher counterparty risk pay higher yields. When counterparty risk is minimal, the premiums or interest rates are low, such as with money market funds.

For example, a company that offers junk bonds will have a high yield to compensate investors for the added risk that the company could default on its obligations. Conversely, a U.S. Treasury bond has low counterparty risk and therefore; rated higher than corporate debt and junk bonds. However, treasuries typically pay a lower yield than corporate debt since there’s a lower risk of default.

**Examples of Counterparty Risk**
When the counterparty risk is miscalculated and a party defaults, the impending damage can be severe. For example, the default of so many collateralized debt obligations (CDO) was a major cause of the real estate collapse in 2008.

**Subprime Risk**

Mortgages are securitized into CDOs for investment and backed by the underlying assets. One of the major flaws of CDOs before the economic crash was that they contained subprime and low-quality mortgages, whereby the CDOs were given the same high-grade ratings as corporate debt.

The high credit rating for CDOs allowed them to receive institutional investment since funds are required to invest only in highly rated debt. When borrowers began defaulting on mortgage payments, the real estate bubble burst, leaving the investors, banks, and reinsurers on the hook for massive losses. The ratings agencies received a lot of blame for the collapse, which eventually led to the financial market meltdown that defined the bear market of 2007-2009.

**Unit-3**

**Credit exposures**

**What Is Credit Exposure?**

Credit exposure refers to the total amount of credit that a lender avails to a borrower. The magnitude of credit exposure indicates the extent to which the lender is exposed to the risk of loss, in the event that the borrower defaults on the loan. Credit exposure can be minimized through purchasing credit default swaps and other types of financial instruments.

**Understanding Credit Exposure**

Credit exposure is the maximum amount of money that will be lost if the counterparty to a contract defaults on a loan. For example, if a bank has made short-term and long-term loans totaling $100 million to company A, its credit exposure to that business is straightforwardly $100 million.

Banks generally seek to maximize their credit exposures to customers with high credit ratings, while minimizing their exposure to clients with lower credit ratings. If a customer
encounters unexpected financial problems, a bank may seek to reduce its credit exposure in an attempt to mitigate the risk of loss that may arise from a potential default.

**How Lenders Control Credit Exposure**

Lenders have numerous methods of controlling credit exposure. Certain practices are simple, such as a credit card company setting credit limits, based on its evaluation of a borrower’s likely ability to repay the sum owed. For example, it’s logical for a credit card company to impose a $300 credit limit on a college student with no credit history until he or she demonstrates a proven track record of making on-time payments.

At the other end of the spectrum, the same credit card company may be strategically justified in offering a $100,000 limit to a high-income customer with a FICO score above 800. In the first instance, the card company is reducing its credit exposure to a higher-risk borrower. In the latter scenario, the company is shrewdly increasing its exposure to an A-paper borrower.

More complex methods to limit credit exposure include purchasing credit default swaps, which effectively transfer credit risk to a third party. The swap buyer makes premium payments to the seller, who agrees to assume the risk of the debt, and compensate the buyer with interest payments—while also returning his premiums if the borrower defaults. Credit default swaps played a major role in the financial crisis of 2008, as sellers misjudged the risk of the debt they were assuming when issuing swaps on bundles of subprime mortgages.

**Credit Exposure vs. Credit Risk**

The terms "credit exposure" and "credit risk" are often used interchangeably. But in actuality, credit exposure is a component of credit risk, that measures the potential magnitude of loss if a default occurs.

The probability of default measures how likely the borrower will be unable or unwilling to repay the debt. The recovery rate quantifies the portion of the loss likely to be recovered through bankruptcy proceedings or other collection efforts.

**What is Recovery Rate?**

Recovery rate, commonly used in credit risk management, refers to the amount recovered when a loan defaults. In other words, recovery rate is the amount, expressed as a percentage, recovered from a loan that is unable to settle the full outstanding amount. A
A higher rate is always desirable. Although the rate is typically used for debt defaults, it can also be used for account receivables defaults.

**Formula for Recovery Rate**

\[
\text{Recovery Rate} = \frac{\text{Amount Recovered}}{\text{Amount Loaned}}
\]

Where:

- Amount Recovered is the dollar amount that the issuer received over the period of the loan.
- Amount Loaned is the amount that the issuer loaned out.

**Factors that Affect the Recovery Rate**

When looking at factors that can affect the recovery rate, the most notable factors are poor macroeconomic conditions and business issues.

**Macroeconomic conditions**

Poor macroeconomic conditions significantly affect the recovery rate for loans. Recovery rates are typically lower during a severe economic recession. During poor macroeconomic conditions, businesses face reduced profitability and a greater risk of defaulting on its debt. For example, consider the following scenario:

ABC Company is facing profitability issues and will default on its loan in the coming year. The outstanding amount is $1,000,000. In a strong economy, the company is able to generate $900,000 to pay off its loan. In a weak economy, the company is only able to generate $300,000.

As illustrated above, for a company that is expected to default on its debt, poor macroeconomic conditions decrease the recovery rate as the company is generating fewer profits to settle its debt.
Business Issues

Business failure caused by unforeseen business issues impacts the recovery rate. For example, a catastrophic fire that results in the inability to conduct business may result in the company defaulting on its debt, hence impacting the recovery rate. In short, business issues that affect a company’s ability to conduct business and generate profits play a key role in the recovery rate.

Recovery Rates Within a Capital Structure

Debt that is more senior within a capital structure offers a higher recovery rate. It is due to the senior debt being accorded more claims to assets as opposed to debt ranked lower in the capital structure. In a data report issued by Moody’s, the average corporate debt recovery rate in 2017 was 81.3% for loans, 52.3% for senior secured bonds, 52.3% for senior unsecured bonds, and 4.5% for subordinated bonds. To illustrate the fact, consider the following example:

A company is facing bankruptcy and owns $500,000 in distributable assets to senior secured debt holders and subordinated debt holders. Senior secured debt holders are owed $700,000 while subordinated debt holders are owed $1,000,000. What is the recovery rate for the two different debt holders?
Senior debt holders are given a higher priority in the capital structure. In other words, assets must first be distributed to senior debt holders before subordinated debt holders are paid. Since senior debt holders are owed $700,000 and the company only holds $500,000 in assets, all assets of the company are given to senior debt holders for a recovery rate of 71%. Subordinated debt holders are left with no assets, as they’ve already been distributed, and face a recovery rate of 0%.

**Operational and integrated Risk Management**

Operational Risk Management is a methodology for organizations looking to put into place real oversight and strategy when it comes to managing risks. Every business faces circumstances or fundamental changes in their situation that can be seen as presenting varying levels of risk to that business, from minor inconveniences to potentially putting its very existence in jeopardy.

The Basel Committee on Banking Supervision has described operational risk as: “the risk of loss resulting from inadequate or failed internal processes, people, and systems, or from external events. As such, operational risk captures business continuity plans, environmental risk, crisis management, process systems, and operations risk, people related risks and health and safety, and information technology risks.”

All of these risks need to be managed and the more sophisticated the approach to risk management, the more chance the business has to thrive and grow.

**The Benefits Of Operational Risk Management**

Before you decide whether or not you want to investigate how Operational Risk Management works and what you need to do to implement it, you will want to know what the potential benefits of it are.

These will help to convince those with sign-off on the decision that it is the right move for your organization, so here are the main benefits of Operational Risk Management:

- Improving the reliability of business operations
- Improving the effectiveness of the risk management operations
- Strengthening the decision-making process where risks are involved
- Reduction in losses caused by poorly-identified risks
- Early identification of unlawful activities
- Lower compliance costs
- Reduction in potential damage from future risks
There are plenty more benefits as well as a few challenges, as with any major business process, but Operational Risk Management is an essential step for every company that is looking to avoid potentially damaging issues.

**How Does Operational Risk Management Work?**

The first stage of any Operational Risk Management strategy is of course to understand the nature of your business and the particular risks associated with it. If you manage a company that runs water ski lessons, there will be risks your business will face that are very different to a company that creates technology for vending machines. Spending time worrying about risks that are nothing to do with you is just wasting time.

There are three levels of Operational Risk Management that you can choose to embark upon, and these are as follows:

**In-depth:** As the name suggests, this is the kind of risk management that we would all be undertaking in an ideal world, as it will deliver the best results and practically make risk a thing of the past (not completely, of course, as not every risk is foreseeable). We don't live in an ideal world, but there are still many situations when you can take the time to plan for a new project or business venture with in-depth Operational Risk Management, which can include staff training or and the implementation of new policies and procedures.

**Deliberate:** This is still not ‘panic stations’ in the world of risk management but is undertaken at various stages during the life cycle of a project or a business and can come in the form of routine safety checks or performance reviews.

**Time-Critical:** This kind of Operational Risk Management involves more urgency as it is usually done in the midst of operational change when there is only a limited amount of time for it to be done before the potential consequences of any non-identified risks might start to be felt. The US Navy has the following processes for time-critical ORM: Assess the situation; Balance your resources: Communicate risks and intentions; and do and debrief.

**Stages Of Operational Risk Management**

Those were the stages the Navy uses for time-critical Operational Risk Management, but for a more standard risk management process these are the usual stages you will need to undertake:

**Risk Identification:** As mentioned earlier, understanding the risks specific to your business is key, but there are also many potential risks that affect any kind of business and you need to identify all of them, both those that are recurring and those that can be one-off events. The identification process needs to involve staff from all levels of the business if
possible, bringing a variety of backgrounds and experiences to make a cohesive result. Risks that can be identified by work floor staff will be very different and no less critical than those identified from the boardroom.

**Risk Assessment:** Once the risks have been identified, they need to be assessed. This needs to be done from both a quantitative and qualitative perspective and factors like the frequency and severity of occurrence need to be taken into consideration. The assessment needs to prioritize the management of these risks in relation to those factors.

**Measurement and Mitigation:** Mitigating these risks (if not actually eliminating them altogether) is the next stage, with controls put in place that should limit the company’s exposure to the risks and the potential damage caused by them.

**Monitoring and Reporting:** Any Operational Risk Management plan must have something in place for the ongoing monitoring and reporting of these risks if only to demonstrate how effective the plan has been. Most of all, it’s to ensure that the solutions put in place are continuing to be effective and doing their job in managing the risks.

There are other processes and models out there, particularly in the banking world, but most follow similar approaches to the one listed above. As long as you are picking an approach that suits your specific needs and situation, you will be on the way to a successful Operational Risk Management strategy.

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**Integrated Risk Management (IRM)**

**Integrated risk management (IRM)** is a set of practices and processes supported by a risk-aware culture and enabling technologies, that improves decision making and performance through an integrated view of how well an organization manages its unique set of risks.

Under the Gartner definition, IRM has certain attributes:
1. **Strategy**: Enablement and implementation of a framework, including performance improvement through effective governance and risk ownership
2. **Assessment**: Identification, evaluation and prioritization of risks
3. **Response**: Identification and implementation of mechanisms to mitigate risk
4. **Communication and reporting**: Provision of the best or most appropriate means to track and inform stakeholders of an enterprise’s risk response
5. **Monitoring**: Identification and implementation of processes that methodically track governance objectives, risk ownership/accountability, compliance with policies and decisions that are set through the governance process, risks to those objectives and the effectiveness of risk mitigation and controls.
6. **Technology**: Design and implementation of an IRM solution (IRMS) architecture

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**Risk management and capital Management**

Risk management is the process of identifying, assessing and controlling threats to an organization’s capital and earnings. These threats, or risks, could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disasters. IT security threats and data-related risks, and the risk management strategies to alleviate them, have become a top priority for digitized companies. As a result, a risk management plan increasingly includes companies’ processes for identifying and controlling threats to its digital assets, including proprietary corporate data, a customer’s personally identifiable information (PII) and intellectual property.

Every business and organization faces the risk of unexpected, harmful events that can cost the company money or cause it to permanently close. Risk management allows organizations to attempt to prepare for the unexpected by minimizing risks and extra costs before they happen.

**Important benefits of risk management include:**

> Creates a safe and secure work environment for all staff and customers.
> Increases the stability of business operations while also decreasing legal liability.
> Provides protection from events that are detrimental to both the company and the environment.
> Protects all involved people and assets from potential harm.
> Helps establish the organization’s insurance needs in order to save on unnecessary premiums.
Risk management strategies and processes

All risk management plans follow the same steps that combine to make up the overall risk management process:

**Establish context.** Understand the circumstances in which the rest of the process will take place. The criteria that will be used to evaluate risk should also be established and the structure of the analysis should be defined.

**Risk identification.** The company identifies and defines potential risks that may negatively influence a specific company process or project.

**Risk analysis.** Once specific types of risk are identified, the company then determines the odds of it occurring, as well as its consequences. The goal of risk analysis is to further understand each specific instance of risk, and how it could influence the company's projects and objectives.

**Risk assessment and evaluation.** The risk is then further evaluated after determining the risk's overall likelihood of occurrence combined with its overall consequence. The company can then make decisions on whether the risk is acceptable and whether the company is willing to take it on based on its risk appetite.

**Risk mitigation.** During this step, companies assess their highest-ranked risks and develop a plan to alleviate them using specific risk controls. These plans include risk mitigation processes, risk prevention tactics and contingency plans in the event the risk comes to fruition.

**Risk monitoring.** Part of the mitigation plan includes following up on both the risks and the overall plan to continuously monitor and track new and existing risks. The overall risk management process should also be reviewed and updated accordingly.

**Communicate and consult.** Internal and external shareholders should be included in communication and consultation at each appropriate step of the risk management process and in regards to the process as a whole.
Risk management approaches

After the company's specific risks are identified and the risk management process has been implemented, there are several different strategies companies can take in regard to different types of risk:

**Risk avoidance.** While the complete elimination of all risk is rarely possible, a risk avoidance strategy is designed to deflect as many threats as possible in order to avoid the costly and disruptive consequences of a damaging event.

**Risk reduction.** Companies are sometimes able to reduce the amount of effect certain risks can have on company processes. This is achieved by adjusting certain aspects of an overall project plan or company process, or by reducing its scope.

**Risk sharing.** Sometimes, the consequences of a risk is shared, or distributed among several of the project’s participants or business departments. The risk could also be shared with a third party, such as a vendor or business partner.

**Risk retaining.** Sometimes, companies decide a risk is worth it from a business standpoint, and decide to keep the risk and deal with any potential fallout. Companies will often retain a certain level of risk if a project’s anticipated profit is greater than the costs of its potential risk.

**Limitations**

While risk management can be an extremely beneficial practice for organizations, its limitations should also be considered. Many risk analysis techniques -- such as creating a model or simulation -- require gathering large amounts of data. This extensive data collection can be expensive and is not guaranteed to be reliable.

Furthermore, the use of data in decision making processes may have poor outcomes if simple indicators are used to reflect the much more complex realities of the situation.
Similarly, adopting a decision throughout the whole project that was intended for one small aspect can lead to unexpected results.

Another limitation is the lack of analysis expertise and time. Computer software programs have been developed which simulate events that might have a negative impact on the company. While cost effective, these complex programs require trained personnel with comprehensive skills and knowledge in order to accurately understand the generated results. Analyzing historical data to identify risks also requires highly trained personnel. These individuals may not always be assigned to the project. Even if they are, there frequently is not enough time to gather all their findings, thus resulting in conflicts.

**A false sense of stability.** Value-at-risk measures focus on the past instead of the future. Therefore, the longer things go smoothly, the better the situation looks. Unfortunately, this makes a downturn more likely.

**The illusion of control.** Risk models can give organizations the false belief that they can quantify and regulate every potential risk. This is not true because it is impossible to expect the unexpected. Furthermore, there is no historical data for new products, so there's no experience to base models on.

**Failure to see the big picture.** It's difficult to see and understand the complete picture of cumulative risk.

**Risk management is immature.** There is still a long way to go before techniques and models are developed that truly fit the risk management purpose.

**Capital Management**

**What Is Working Capital Management?**

Working capital management is a business strategy designed to ensure that a company operates efficiently by monitoring and using its current assets and liabilities to the best effect. The primary purpose of working capital management is to enable the company to maintain sufficient cash flow to meet its short-term operating costs and short-term debt obligations.
A company's working capital is made up of its current assets minus its current liabilities.

**Understanding Working Capital Management**

Current assets include anything that can be easily converted into cash within 12 months. These are the company’s highly liquid assets. Some current assets include cash, accounts receivable, inventory, and short-term investments.

**KEY TAKEAWAYS**

- Working Capital Management requires monitoring a company's assets and liabilities to maintain sufficient cash flow.
- The strategy involves tracking three ratios: the working capital ratio, the collection ratio, and the inventory ratio.
- Keeping those three ratios at optimal levels ensures efficient working capital management.

Current liabilities are any obligations due within the following 12 months. These include operating expenses and long-term debt payments.

**Ratio Analysis**

Working capital management commonly involves monitoring cash flow, current assets, and current liabilities through ratio analysis of the key elements of operating expenses, including the working capital ratio, collection ratio, and inventory turnover ratio.

Working capital management helps maintain the smooth operation of the net operating cycle, also known as the cash conversion cycle (CCC)—the minimum amount of time required to convert net current assets and liabilities into cash.

**Benefits of Working Capital Management**

Working capital management can improve a company's earnings and profitability through efficient use of its resources. Management of working capital includes inventory management as well as management of accounts receivables and accounts payables.

The objectives of working capital management, in addition to ensuring that the company has enough cash to cover its expenses and debt, are minimizing the cost of money spent on working capital, and maximizing the return on asset investments.

**Basel Norms**

**Basel is a city in Switzerland** which is also the headquarters of Bureau of International Settlement (BIS).
The Bank for International Settlements (BIS) established on 17 May 1930, is the world’s oldest international financial organisation. There are two representative offices in the Hong Kong and in Mexico City. In total BIS has 60 member countries from all over the world and covers approx 95% of the world GDP.

Objective

- The set of the agreement by the BCBS (BASEL COMMITTEE ON BANKING SUPERVISION), which mainly focuses on risks to banks and the financial system are called Basel accord.
- The purpose of the accord is to ensure that financial institutions have enough capital on account to meet the obligations and absorb unexpected losses.
- India has accepted Basel accords for the banking system.
- BASEL ACCORD has given us three BASEL NORMS which are BASEL 1,2 and 3.

Tier 1 - The Tier-I Capital is the core capital
Paid up Capital, Statutory Reserves, Other disclosed free reserves, Capital Reserves which represent surplus arising out of the sale proceeds of the assets, other intangible assets belong from the category of Tier 1 capital.

Tier 2 - Tier-II capital can be said to be subordinate capitals.
Undisclosed reserves, Revaluation Reserves, General Provisions and loss reserves, Hybrid debt capital instruments such as bonds, Long term unsecured loans, Debt Capital Instruments etc belong from the category of Tier 2 capital.

Risk Weighted Assets
RWA means assets with different risk profiles; it means that we all know that is much larger risk in personal loans in comparison to the housing loan, so with different types of loans the risk percentage on these loans also varies.

BASEL-I

- In 1988, The Basel Committee on Banking Supervision (BCBS) introduced capital measurement system called Basel capital accord, also called as Basel 1.
- It focused almost entirely on credit risk, It defined capital and structure of risk weights for banks.
- The minimum capital requirement was fixed at 8% of risk-weighted assets (RWA).
- India adopted Basel 1 guidelines in 1999.
BASEL-II

In 2004, Basel II guidelines were published by BCBS, which were considered to be the refined and reformed versions of Basel I accord. The guidelines were based on three parameters which are as follows:

- Banks should maintain a minimum capital adequacy requirement of 8% of risk assets.
- Banks were needed to develop and use better risk management techniques in monitoring and managing all the three types of risks that is credit and increased disclosure requirements.
- The three types of risk are: operational risk, market risk, capital risk.
- Banks need to mandatory disclose their risk exposure, etc to the central bank.
- Basel II norms in India and overseas are yet to be fully implemented.
In 2010, Basel III guidelines were released. These guidelines were introduced in response to the financial crisis of 2008. In 2008, Lehman Brothers collapsed in September 2008, the need for a fundamental strengthening of the Basel II framework had become apparent. Basel III norms aim at making most banking activities such as their trading book activities more capital-intensive. The guidelines aim to promote a more resilient banking system by focusing on four vital banking parameters viz. capital, leverage, funding and liquidity. Presently Indian banking system follows Basel II norms. The Reserve Bank of India has extended the timeline for full implementation of the Basel III capital regulations by a year to March 31, 2019.

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