# Risk and Return analysis

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# Plan

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# I. Return Analysis

## 1. Definition of retrurn

The prime objective of making investment in any security is either to yield income on that investment in form of dividend/ interest or appreciation in the investment value. Return is the motivating force and the principal reward in the investment. An appreciation in the investment can also be considered as capital gain on investment. A rate of return on investment provides a basis of comparison among given alternative investment opportunities. There are two types of returns are, commonly, discussed under investment management, first, realised return and second, expected return. The realized return is the actual outcome on investment, on the other hand expected return is the probable return on investment over future period. The expected return is calculated for both purposes i.e., annual return, as well as capital growth in investment over a given future period.

The term yield is often used in connection with return. Yield refers to the income component in relation to the price paid for a security, as well as change in price of the investment (at the time of selling such security) in relation to the price at which it was bought. In order to compute total return, one has to consider probable decrease or increase in the principal amount of investment along with annual income on such investment, thus,

Total Return = Income + Change in Price of Investment (+/–)

**Return on equity (in percent value) will be computed as given below:**

$$\text{Return} = \frac{\text{Income}}{\text{Price paid for security}} + \frac{\text{Change in price of a security over a period}}{\text{Price paid for security}}$$

$$\text{Or,} \quad \text{Return (\%)} = \frac{\text{Income} + \text{Change in price of security over a period}}{\text{Price paid for security}} \times 100$$

$$\text{Or,} \quad \text{Return} = \frac{D_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

Or, $\text{Return}\,(\%) = \dfrac{D_1 + (P_1 - P_0)}{P_0} \times 100$

Where,

$R(\%)$ = Rate of return, i.e., yield.

$D_1$ = Dividend received at the end of year, denoted by 1.

$P_0$ = The value of investment made in year '0'.

$P_1$ = The value of investment in year '1', to be considered as the year in which security will be realised/sold.

Similarly, the yield on fixed interest-bearing securities may also be computed by replacing 'D' with 'I' i.e., interest.

$$\text{Return (\%) on debt security} = \frac{I_1 + (P_1 - P_0)}{P_0}$$

## 2. Types of Return

There are different methods to compute return, some are based on measure of central tendency, or others are on probability distribution. These methods are used when the data on investments spread over number of years, and it becomes difficult to draw a conclusive inference on the basis of individual/yearly results on investments. The selected methods are discussed in the following part of this chapter.

# A. Simple Average Method

Simple average method is arithmetic mean of the yield over number of years. Simple average is equal to sum of all given observations divided by number of observations. Thus,

$$\bar{X} = \frac{\Sigma Ri}{N}$$

Where,

$R_i$ = Total return on investment,

N = Number of observations.

Simple average method follows inherent limitations. Thus, it is not advisable to take help of simple average method while taking decision in investment management. A critical issue of investment management, i.e., compounding factor is not addressed by simple average method.

# B. Geometric mean

The advantage of using geometric mean is that it accounts compounding factor or cumulative returns over time in calculation. It is used in investments to reflect the realized change in wealth over multiple periods. The geometric average is defined as the $N^{th}$ root of the product resulting from multiplying a series of returns together, as shown below.

$$G = [(1 + R_1)(1 + R_2) \ldots\ldots\ldots (1 + R_n)]^{1/n} - 1$$

Where,

R = Total returns,

N = Number of periods.

# C. Expected rate of return

The expected rate of return is the weighted average of all possible returns multiplied by their respective probabilities. In symbols:

$$E(R) = \sum_{i=1}^{n} R_i P_i$$

Where,

E (R) = expected return from the stock

$R_i$ = return from stock under state i

$P_i$ = probability that the state i occurs

n = number of possible states of the world

# II. Risk Analysis

## 1. Definition of risk

Webster's dictionary defines risk in the context of investments as the potential for an asset, such as stock or commodity, to decrease in value. Risk, in a broader sense, refers to the likelihood that an investment's actual return will fall short of its anticipated return. In the financial markets, since investors dislike risks while prefer assets with high expected returns, investors typically require higher expected returns as compensation for assuming greater levels of risk. The principle is that the more substantial the risk one takes, the greater the return they will demand to justify the possibility of incurring a loss. This dynamic is fundamental to investment strategy and affects how portfolios are constructed, as investors seek to align their risk tolerance with their financial goals.

# 2. Sources of Risk

## A. Market Risk

Even though the company's earnings do not change, market prices of investments, particularly equity shares, may fluctuate in a short period. The causes for this pricing change could be several. Investors' attitudes toward equities may change as a result of one or more factors, leading to a change in market price. The return on investment varies depending on the market price. This is referred to as market risk. Market risk is the variation in return caused by changes in the market price of an investment and arises as a result of investors' reactions to various key occurrences. The market prices of equity shares are affected by a variety of social, political, economic, and firm-specific events

## B. Interest-Rate Risk

The interest rate influences the return on securities in a variety of ways. Because investors always compare risk-free return with expected return on investment, it has an impact on the expected or required rate of return. When the interest rate rises, the expected or needed rate of return on other assets rises as well. Thus, the interest rates on risk-free (government) securities and the general rate of interest are linked. The rate of interest on other bond securities rises or falls in tune with the riskfree rate of interest. Interest rate risk refers to the variation in return induced by market price changes in fixed income products, such as bonds and debentures. The price of a security (bonds and debentures) is inversely proportional to the level of interest rates. Existing securities' prices decline when the interest rate rises, and vice versa. Changes in interest rates have a direct impact on bond and debenture prices, as well as an indirect impact on equity share values.

## C. Inflation Risk

Inflation risk is the variability in the total purchasing power of an asset. It arises from the rising general price level. Thus, it refers to the unpredictability of the buying power of cash flows expected from an investment. It depicts how inflation or deflation affects an investment. Interest rates on bonds and debentures, as well as dividend rates on stock and preference shares, are expressed in money terms, and if the general price level rises in the future, the purchasing power of cash interest/dividend income will certainly drop. If the money rate of return is equal to the rate of inflation, the investor obtains a zero rate of return.

## D. Business Risk

Business enterprises work in a constantly changing environment, which makes expected income to fluctuate. A change in government policy on fertilizer subsidies, for example, could harm a group of fertilizer companies. Similarly, a competitor's conduct, whether domestic or foreign, might have an impact on other businesses. While the aforementioned changes in the environment are the result of specific entities, several other elements alter the operational environment but can not be traced to a particular sources. For example, many businesses are affected by the business cycle, and their earnings fluctuate dramatically from one year to the next.

## E. Financial Risk

When the company capital structure includes debt, financial risk occurs. Debt creates a fixed liability, which increases the income variability available to equity stockholders and it is not always a negative thing. It will boost profitability when the company performs well, and stock investors receive a higher return than would otherwise be available. Because of the fixed liability, debt causes problems in poor times. If the company fails to satisfy its debt obligations, the managers will have to spend a significant amount of time convincing lenders to accept a delayed payment, wasting valuable managerial time in the process.

## F. Management Risk:

Management risk is the portion of total return variability caused by managerial actions in companies where the owners are not the managers. Regardless of how experienced the Management team is, there is always the risk of making a mistake or making the wrong decision. Owners investors are rightfully enraged when executives are paid large salaries and bonuses and are given ego-boosting non-income spendings such as fancy automobiles and lavishly equipped offices, but their poor decisions put the company in serious trouble.

## G. Liquidity Risk

The inability of a seller to sell assets without offering price reductions and commissions is known as liquidity risk. It is simple to rate assets based on their liquidity. A country's currency unit is immediately saleable at par, with no requirement for a discount or other concessions. The next most liquid asset class is government securities and blue-chip stocks. Some tiny and lesser-known corporations' debt securities and equity shares are less liquid, if not illiquid. Due to lack of liquidity, investors are forced to sell securities at a lower price than the current price, especially when the quantity to be sold is significant. Therefore, when choosing securities, investors must consider the liquidity risk also.

## H. Social or Regulatory Risk:

The social or regulatory risk emerges when an otherwise successful venture is harmed by unfavorable legislation, a harsh regulatory environment, or, in the worst-case scenario, nationalization by a socialist government. Price controls may lower the revenues of industrial enterprises and rent controls may largely eliminate the value of rental property. The social risk is essentially political and thus unpredictable, but no industry can expect to be immune to it under a representative democracy based on rising government interference in corporate matters.

## I. Other Risks:

The monetary value risk and the political environment risk are two further categories of risk, particularly when investing in foreign assets. The investor who purchases foreign government bonds or securities of foreign firms in the hope of obtaining a slightly better yield than domestic issues, bear the calculated risk of:

- a change in the foreign government and repudiation of outstanding debt,
- nationalization of business firms, that is, seizure by the government, or
- the desire but the inability of the foreign government or corporation to handle its indebtedness.

# 3. Types of Risk

## 3.1. Systematic Risk.

The portion of return variability induced by factors impacting all enterprises is referred to as systematic risk. Diversification will not be able to mitigate such a risk. The following are some examples of systemic risk:

- The government changes the interest rate policy.
- The corporate tax rate is increased.
- The government resorts to massive deficit financing.
- The inflation rate increased.
- The Central Bank of the Country promulgates a restrictive credit policy.
- Government fails to attract FIIs

## 3.2. Unsystematic Risk

The unsystematic risk is the variation in the return of an investment owing to factors that are specific to the firm and not to the market as a whole. Unsystematic, or unique risk, is a type of risk that can be completely mitigated through diversification. The following are some examples of unsystematic risk:

- Workers declare a strike in a company.
- The R&D expert of the company leaves.
- A formidable competitor enters the market.
- The company loses a big contract in a bid.
- The company makes a breakthrough in process of innovation.
- The government increases custom duty on the material used by the company.
- The company is not able to obtain an adequate quantity of raw material used by the company.

# 4. Measurement of Risk

## 4.1. Standard Deviation

Standard Deviation measures the variation in actual return from the expected average return. A low value of standard deviation indicates actual return likely to be close to average return, on the other hand, a high value of standard deviation shows lesser possibility of actual return close to average return. The standard deviation (SD) is symbolized with sigma, 'σ'. The statistical formula to calculate standard deviation is:

$$SD = \sqrt{\frac{\sum_{i=1}^{N}\left(X_i - \bar{X}_l\right)^2}{N}}$$

Where,

$X_i$ = Actual return on investment,

$\bar{X}_l$ = Average return, and

N = Number of observations

The dispersion of a variable is referred to as risk. The variance or standard deviation are usually used to calculate it. The sum of the squares of the deviations of actual returns from the expected return, weighted by the related probabilities, is the variance of a probability distribution. In terms of symbols,

$$\sigma^2 = \sum P_i \times [R_i - E(R)]^2$$

Where,

$\sigma^2$ = Variance

$R_i$ =return for the ith possible outcome

$P_i$ = Probability associated with the ith possible outcome

E (R ) = Expected return

Since variance is expressed as squared returns it is somewhat difficult to grasp. So, its square root, the standard deviation, is employed as an equivalent measure.

$$\sigma = \sqrt{\sigma^2}$$

## 4.2. Semi-Variance:

There are many measures of risk that previous studies have addressed, and Markowitz considered the variance in the distribution of returns to be one of the effective measures for this, but the variance has faced many criticisms. Therefore, Markowitz suggested using something like variance, which focuses on the investor's interest in reducing fluctuations in returns.

While it seems that the deviation that is higher than the arithmetic mean is one of the preferred things for managers, the reality indicates that the deviations that are lower than the mean, or what is called down side risk, are what are taken into account in the decision-making process, and one of the best measures used for this is what is called semi-variance.

It is calculated by the following equation:

$$S.V = \sum Pi\ (Ri - E(Ri))2$$

where:

S.V: semi-variance

Ri: Values of returns that are less than the expected value

K: The number of returns that are less than expected values

If the project's semi-variance is lower, the project is less risky

# 4. 3. Coefficient of Variation:

In the case of comparison between several projects characterized by the equality of their arithmetic averages of project returns, the best measure is the variance. However, if they are not equal, it is preferable to rely on the coefficient of variation, which is a measure of relative variance because relying on it helps in overcoming the problem of the arithmetic averages of the returns to be compared not being equal, as There is a starting rule for comparison between projects with different average returns, and it is calculated by dividing the standard deviation by the arithmetic mean of the expected return - or the average expected value in cases of future data -

$$C.V = \delta / E(Ri)$$

where:

C.V: Coefficient of variation

δ: standard deviation

$\bar{X}$, $E(Ri)$ : expected value of returns (arithmetic mean)

A project with a lower coefficient of variation is considered less risky.

# II. Different values of financial security:

This section will discuss the critical distinctions between face, book, and market value, offering insights into their importance.

## 1. Face Value

Face value refers to the nominal or par value of a financial instrument, such as a bond or a stock, as indicated on the instrument. It represents the initial value assigned to the security during issuance. For instance, if you hold a bond with a face value of $1,000, the bond will mature and be redeemed at this amount. Face value remains constant throughout the life of the security and is used primarily for accounting purposes.

## 2. Book Value

Book value, also known as net asset value (NAV), measures an entity's total net worth or equity. It determines the value of a company's assets that shareholders would receive in liquidation by subtracting liabilities from assets. Book value provides insights into the company's intrinsic value based on its financial statements and can be a useful metric for value investors.

## 3. Market Value

On the other hand, market value is the current price at which a financial instrument or asset can be bought or sold in the open market. Various factors influence it, including supply and demand, investor sentiment, economic conditions, and company performance. Market value is dynamic and can fluctuate significantly over time, often deviating from an asset's face value and book value.

The table below highlights the main differences between face value, book value, and market value:

| Aspect | Face Value | Book Value | Market Value |
| --- | --- | --- | --- |
| Meaning | Nominal value on the security | Net worth of the company | Current market price |
| Application | Accounting and legal context | Investment analysis | Buying and selling in market |

| | | | |
|---|---|---|---|
| Relationship | Remains constant | Historical and intrinsic value | Dynamic and fluctuating |
| Significance | Relevant for issuance | Relevant for valuation | Reflects current market sentiment |
| Calculation | Stated on the instrument | Assets – Liabilities | Determined by market forces |


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