

# Risk and Return: Concept, Types and Measurement of Risk, Return, Beta and Variance

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**Abstract—** Risk and return are central to investment analysis and portfolio management in modern finance. Every investment decision involves a trade-off between expected return and the uncertainty of achieving it. This paper examines the concept, types, and measurement of risk and return, with emphasis on systematic and unsystematic risk, various forms of return, and key quantitative measures such as variance, standard deviation, coefficient of variation, and beta. It also highlights the role of diversification in risk reduction and explains the significance of beta and variance in asset pricing and portfolio theory. The study aims to provide conceptual clarity and a strong analytical foundation for understanding investment risk and return.

## I. CONCEPT OF RISK AND RETURN

Risk and return constitute the foundational pillars of investment analysis and portfolio management. Every investment decision made in financial markets is essentially a trade-off between the expected return from an asset and the risk associated with achieving that return. Rational investors seek to maximize returns while simultaneously minimizing risk, though in practice these two objectives are often in conflict. The relationship between risk and return explains investor behavior, asset pricing, and portfolio construction in both theoretical and practical frameworks of finance.

Return represents the reward that an investor expects or realizes from an investment over a specific period of time. It serves as the primary motivation for committing capital to financial assets such as equities, bonds, mutual funds, or derivatives. Returns may arise in the form of periodic income, such as dividends or interest, as well as capital appreciation resulting from an increase in the market value of the asset. From an analytical perspective, return is not merely an outcome but an expectation formed based on historical performance, economic conditions, firm-specific factors, and market dynamics.

Risk, on the other hand, refers to the uncertainty associated with the actual return deviating from the expected return. It captures the possibility that the realized outcome of an investment may differ from what was initially anticipated, including the chance of earning lower returns or even incurring losses. In investment theory, risk is not limited to unfavorable outcomes alone but encompasses variability in returns, whether positive or negative. Thus, an asset with highly fluctuating returns is considered riskier than one offering stable and predictable returns.

The fundamental principle governing financial decision-making is the risk–return trade-off, which asserts that higher levels of risk are associated with the potential for higher returns. Investors are generally risk-averse, meaning they require additional compensation in the form of higher expected returns to accept greater uncertainty. Consequently, low-risk investments such as government securities tend to offer modest returns, while high-risk instruments such as equities or speculative assets provide the possibility of superior returns. This trade-off forms the basis for asset pricing models and portfolio optimization strategies.

From a portfolio management perspective, risk and return must be evaluated jointly rather than independently. The return on an individual security contributes to the overall return of a portfolio, while the risk of the portfolio depends not only on the riskiness of individual assets but also on the correlation among them. This insight highlights the importance of diversification, where combining assets with imperfect correlations can reduce overall portfolio risk without proportionately sacrificing return. Hence, understanding the nature of risk and return is essential for constructing efficient portfolios that align with investor objectives and risk tolerance. In modern financial theory, the concept of risk is further refined into systematic and unsystematic components. Systematic risk arises from

macroeconomic factors such as inflation, interest rates, and economic cycles, affecting the entire market and remaining unavoidable through diversification. Unsystematic risk originates from firm-specific factors such as management efficiency, operational performance, or financial structure and can be substantially reduced through proper portfolio diversification.

The concepts of risk and return form the intellectual foundation of investment analysis and portfolio management. Return represents the objective of investment activity, while risk captures the uncertainty inherent in achieving that objective. Their interdependent relationship governs investor behavior, asset valuation, and portfolio construction. A comprehensive understanding of risk and return is therefore indispensable for effective investment decision-making in increasingly complex and dynamic financial markets.

## II. TYPES AND MEASUREMENT OF RISK

Risk is an inseparable part of every investment decision. Every investment is characterised by two fundamental elements, namely return and risk. While return represents the reward expected from an investment, risk refers to the uncertainty associated with achieving that return. Investors base their decisions on expected returns; however, actual returns often differ due to economic, market-related, and company-specific factors. Therefore, understanding the types of risk and their measurement is essential for sound investment decisions and effective portfolio management.

### Risk: Meaning and Concept

Risk is an inherent and unavoidable element of every investment decision. It arises due to the uncertainty associated with future outcomes. When an investor commits funds to an investment, a certain return is expected to be earned in the future. However, since future economic and market conditions cannot be predicted with certainty, the actual return realised may differ from the expected return.

### Types of Risk

#### 1. Systematic Risk

Systematic risk refers to that portion of total risk which arises due to factors that affect all securities in the market simultaneously. These factors are largely

uncontrollable and originate from changes in the economic, political, and social environment. Systematic risk cannot be eliminated through diversification because it affects the entire market.

Systematic risk is further classified into the following types:

(a) **Interest Rate Risk:** Interest rate risk mainly affects fixed-income securities such as bonds and debentures, though it also indirectly affects equity shares. Bonds are issued with a fixed coupon rate of interest. When market interest rates change after the issue of a bond, its market price changes inversely. If market interest rates rise above the coupon rate, the bond's market price falls. Conversely, if market interest rates fall below the coupon rate, the bond's market price rises. This inverse relationship between bond prices and interest rates gives rise to interest rate risk. Interest rate changes also influence equity prices indirectly by affecting margin trading and altering the interest expenses of companies using borrowed funds.

(b) **Market Risk:** Market risk refers to the risk arising from fluctuations in stock market prices. Stock markets generally move in cycles such as bullish phases, characterised by rising prices, and bearish phases, marked by falling prices. These movements are influenced by business cycles, political and economic events, and changes in investor expectations and psychological behaviour. Short-term volatility is often caused by collective emotional reactions of investors to news and events. The variability in returns due to overall market movements is known as market risk.

(c) **Purchasing Power Risk:** Purchasing power risk arises due to inflation, which reduces the real value of money. Even when an investor earns a positive nominal return, inflation may erode the real purchasing power of that return. For example, if an investor lends Rs. 100 at 10% interest and receives Rs. 110 after one year, but inflation during the year is 8%, the real purchasing power of the return is reduced. Since inflation affects all securities uniformly, purchasing power risk is systematic in nature.

#### 2. Unsystematic Risk

Unsystematic risk refers to the portion of total risk that arises due to factors specific to a particular

company or industry. These risks are internal in nature and are largely controllable. Unlike systematic risk, unsystematic risk can be reduced or eliminated through diversification.

Unsystematic risk arises from two major sources:

(a) **Business Risk:** Business risk is associated with the operating environment of a firm. It arises due to factors such as changes in demand, availability and cost of raw materials, labour issues, management efficiency, and technological changes. Business risk is closely related to the cost structure of a company, especially the proportion of fixed operating costs. Companies with higher fixed costs face greater business risk, as a small decline in revenue can lead to a disproportionately large decline in operating profits.

(b) **Financial Risk:** Financial risk arises due to the use of debt in a company's capital structure, also known as financial leverage. Debt involves fixed interest payments that must be paid irrespective of profit levels. The use of debt increases variability in earnings per share (EPS). When operating profits exceed the interest cost, EPS increases sharply; when operating profits fall below the interest cost, EPS declines sharply. This fluctuation in EPS due to debt financing constitutes financial risk. Financial risk is company-specific and avoidable, as firms can choose their financing mix.

#### Measurement of Risk

Measurement of risk is essential for investment analysis, as rational investors seek to estimate both the nature and extent of risk before selecting an investment. Risk is measured in relation to return, since variability in returns is the core of investment risk. Statistical tools are used to analyse possible returns, their probabilities, and deviations from expected returns.

Expected return represents the anticipated return from an investment based on various possible outcomes and their associated probabilities. It forms the basis for risk measurement, as all measures of risk assess how actual returns deviate from this expected value. Range is a simple measure of risk that indicates the difference between the highest and lowest possible returns of an investment and provides a preliminary understanding of the extent of variability in returns.

Mean deviation measures the average of the absolute deviations of individual returns from the mean return and considers all observations, thereby offering a better assessment of risk than range. Variance measures the average of the squared deviations of returns from the expected return and reflects the degree of dispersion in returns, with higher variance indicating higher risk. Standard deviation, which is the square root of variance, is the most widely used measure of risk as it expresses volatility in the original units of return and is easier to interpret.

Coefficient of variation measures relative risk by expressing standard deviation in relation to the expected return. It is particularly useful when comparing investments with different average returns, as it indicates the risk per unit of return. Beta ( $\beta$ ) measures systematic risk by indicating the sensitivity of a security's returns to movements in the overall market and reflects the extent to which a security responds to market changes. Total risk represents the combined effect of systematic and unsystematic risk. Together, these measures help investors evaluate fluctuations in returns, compare alternative investments, and construct efficient portfolios, thereby forming the foundation of sound investment and portfolio management.

### III. TYPES AND MEASUREMENT OF RETURN

#### Return: Meaning and Concept

Return refers to the financial benefit earned from an investment over a specific period of time. It represents the reward an investor receives for committing funds and bearing risk. Every investment decision is guided by the expectation of return, which serves as the primary motivation for investing. Returns may arise in different forms depending on the nature of the investment. They can be earned through income generated during the holding period, such as dividends or interest, and through capital appreciation when the value of the investment increases over time.

#### Types of Return

- **Capital Gain Return:** Capital gain return arises when an investment is sold at a price higher than its purchase cost. The difference between the selling price and the purchase price constitutes capital gain, while a sale below cost results in a capital loss. Capital gains are commonly associated with

investments such as equity shares, mutual funds, and real estate, and they largely depend on market movements and economic conditions.

- **Income Return:** Income return refers to the regular earnings generated from an investment during the holding period. It includes dividends from equity shares, interest earned on bonds and other fixed-income securities, and rental income from property.
- **Total Return:** Total return represents the overall return earned from an investment by combining capital gain return and income return. It provides a comprehensive measure of investment performance by considering both price appreciation and income received, thereby offering a more accurate assessment of the true benefit derived from an investment.
- **Expected Return:** Expected return refers to the return an investor anticipates earning in the future. It is generally estimated using historical data, probability analysis, or market expectations. Expected return helps investors compare alternative investment opportunities and select those that align with their risk preferences and financial objectives, though it is not guaranteed.
- **Actual Return:** Actual return is the return that is actually realised over the investment period. It reflects the real performance of the investment and may differ from expected return due to changes in economic conditions, market volatility, and company-specific factors.
- **Nominal Return:** Nominal return refers to the return calculated without adjusting for inflation. It shows the return in monetary terms but does not reflect changes in purchasing power.
- **Real Return:** Real return takes into account the effect of inflation and reflects the actual increase in purchasing power. It is particularly relevant for long-term investment analysis, as inflation can significantly reduce the real value of returns over time.

#### Measurement of Return

Measurement of return refers to the methods used to calculate the gain or loss earned from an investment

over a specific period of time. Accurate measurement of return is essential for evaluating investment performance, comparing different investment alternatives, and making informed financial decisions. Various methods are used to measure return depending on the investment horizon and the nature of cash flows.

**Simple Return / Holding Period Return (HPR):** The simple return, also known as the holding period return, measures the return earned during a single holding period. It considers both the change in the investment's value and any income received, such as dividends or interest.

**Percentage Return:** Percentage return expresses the return earned as a percentage of the initial investment. By converting returns into percentage terms, it allows investors to compare the performance of different investments regardless of their size and easily identify which investment has performed better.

**Average Return:** Average return is used to evaluate an investment's performance over multiple periods. It is calculated by summing the returns of different periods and dividing by the number of periods. While it provides a general idea of historical performance and is simple to compute, it does not account for fluctuations or compounding effects.

**Compound Annual Growth Rate (CAGR):** The compound annual growth rate is a refined method of measuring return over a long-term period. It represents the constant annual rate at which an investment grows from its initial value to its final value over a specified period, assuming that profits are reinvested. CAGR provides a smooth annual growth rate and is useful for comparing long-term investments.

**Annualized Return:** Annualized return converts returns earned over different time periods into an equivalent annual rate. This method is particularly helpful when comparing investments with varying durations, as it standardizes returns on a yearly basis.

**Real Rate of Return:** The real rate of return measures return after adjusting for inflation. Since inflation reduces purchasing power, real return provides a more accurate representation of an investor's actual gain and is especially important for long-term financial planning.

#### IV. TYPES AND MEASUREMENT OF BETA & VARIANCE

Risk and return are inseparable concepts in finance. Every investment decision involves uncertainty, and measuring this uncertainty is essential for rational decision-making. Two of the most important statistical measures used to evaluate investment risk are Beta and Variance. While both relate to risk, they differ in scope, interpretation, and application. This article explains the meaning, types, and measurement of Beta and Variance in a clear and structured manner.

##### Beta: Meaning and Concept

Beta ( $\beta$ ) is a measure of systematic risk, which is the portion of total risk that cannot be eliminated through diversification. It indicates how sensitive the return of a security is to movements in the overall market. In simple terms, Beta explains how much a stock's price is likely to change when the market changes. A Beta value of 1 indicates that the security moves in line with the market. A Beta greater than 1 suggests that the security is more volatile than the market, while a Beta less than 1 indicates lower volatility. A Beta of zero implies no relationship with market movements, and a negative Beta shows that the security tends to move in the opposite direction of the market.

##### Types of Beta

Beta can be classified into different types based on capital structure and investment context.

- Asset Beta (Unlevered Beta) measures the risk of a firm without considering the effect of debt. It reflects only the business or operating risk of the company and is useful when comparing firms with different capital structures.
- Equity Beta (Levered Beta) measures the risk borne by equity shareholders. It includes both business risk and financial risk arising from the use of debt. This is the most commonly reported Beta in financial markets.
- Portfolio Beta represents the systematic risk of an entire portfolio. It is calculated as the weighted average of the Betas of individual securities in the portfolio and indicates how the portfolio as a whole responds to market movements.

##### Measurement of Beta

Beta is statistically measured using the relationship between the returns of a security and the returns of the market. It is calculated as the ratio of the covariance between the security's returns and market returns to the variance of market returns. In practice, Beta is estimated using regression analysis of historical returns, where market returns are taken as the independent variable and security returns as the dependent variable. Market indices such as Sensex or Nifty are commonly used as proxies for the market.

##### Variance: Meaning and Concept

Variance is a measure of total risk associated with a security or a portfolio. It shows how widely the actual returns deviate from the average or expected return. Unlike Beta, variance considers both systematic and unsystematic risk. A higher variance indicates greater volatility and therefore higher risk, while a lower variance indicates more stable returns.

##### Types of Variance

- Individual Security Variance measures the total risk of a single investment. It reflects fluctuations in returns caused by both market-wide factors and firm-specific factors.
- Portfolio Variance measures the risk of a portfolio consisting of multiple securities. Portfolio variance depends not only on the variances of individual securities but also on the correlation between their returns. Effective diversification can significantly reduce portfolio variance.

##### Measurement of Variance

Variance is calculated by finding the average of the squared deviations of individual returns from the mean return. Since variance is expressed in squared units, its square root, known as standard deviation, is more commonly used in practice. Standard deviation provides a more intuitive measure of volatility and is widely used by investors and analysts.

In the case of a portfolio, variance is calculated by considering the weighted variances of individual securities along with the covariance or correlation between them. The inclusion of correlation highlights the importance of diversification in risk reduction.

##### Relationship Between Beta and Variance

Although both Beta and Variance measure risk, they differ in focus and application. Beta measures only

systematic risk and is used extensively in models such as the Capital Asset Pricing Model (CAPM). Variance, on the other hand, measures total risk and forms the foundation of modern portfolio theory. Together, these measures provide a comprehensive understanding of investment risk

## V. CONCLUSION

Risk and return form the core of investment analysis and portfolio management, guiding investor behaviour and financial decision-making. This study has examined the concepts, types, and measurement of risk and return, highlighting the trade-off between expected returns and the uncertainty inherent in financial markets. By distinguishing between systematic and unsystematic risk, the analysis underscores the importance of diversification in minimizing avoidable risk while recognizing that market-related risk remains unavoidable. The paper also discusses various forms and measures of return, emphasizing their relevance in evaluating investment performance. Furthermore, the role of quantitative tools such as variance, standard deviation, coefficient of variation, and beta has been emphasized in assessing risk and understanding asset price behaviour. Overall, a comprehensive understanding of risk and return and their measurement is essential for constructing efficient portfolios, improving investment decisions, and achieving long-term financial objectives in an increasingly complex investment environment.