

# Risk and Return

## Two Sides of the Investment Coin

### LEARNING OBJECTIVES

**After studying this chapter you should be able to**

- Calculate the total return, return relative, and cumulative wealth index.
- Compute the arithmetic mean and geometric mean of a return series.
- Explain the rationale for using standard deviation as the principal measure of risk.
- Measure the expected (ex ante) return and risk of a security.

Investment decisions are influenced by various motives. Some people invest in a business to acquire control and enjoy the prestige associated with it. Some people invest in expensive yachts and famous villas to display their wealth. Most investors, however, are largely guided by the pecuniary motive of earning a return on their investment.

For earning returns investors have to almost invariably bear some risk. In general, risk and return go hand in hand. While investors like returns they abhor risk. Investment decisions, therefore, involve a tradeoff between risk and return. Since risk and return are central to investment decisions, we must clearly understand what risk and return are and how they should be measured.

## 5.1 RETURN

Return is the primary motivating force that drives investment. It represents the reward for undertaking investment. Since the game of investing is about returns (after allowing for risk), measurement of realised (historical) returns is necessary to assess how well the investment manager has done. In addition, historical returns are often used as an important input in estimating future (prospective) returns.

The return of an investment consists of two components:

**Current Return** The first component that often comes to mind when one is thinking about return is the periodic cash flow (income), such as dividend or interest, generated by the investment. Current return is measured as the periodic income in relation to the beginning price of the investment.

**Capital Return** The second component of return is reflected in the price change called the capital return—it is simply the price appreciation (or depreciation) divided by the beginning price of the asset. For assets like equity stocks, the capital return predominates.

Thus, the total return for any security (or for that matter any asset) is defined as:

$$\text{Total return} = \text{Current return} + \text{Capital return}$$

The current return can be zero or positive, whereas the capital return can be negative, zero, or positive.

## 5.2 RISK

You cannot talk about investment return without talking about risk because investment decisions invariably involve a trade-off between the two.

Risk refers to the possibility that the actual outcome of an investment will differ from its expected outcome. More specifically, most investors are concerned about the actual outcome being less than the expected outcome. The wider the range of possible outcomes, the greater the risk.

**Sources of Risk** Risk emanates from several sources. The three major ones are: business risk, interest rate risk, and market risk. While a detailed treatment of these sources of risk is woven throughout the book, a brief discussion is given here.

**Business Risk** As a holder of corporate securities (equity shares or debentures), you are exposed to the risk of poor business performance. This may be caused by a variety of factors like heightened competition, emergence of new technologies, development of substitute products, shifts in consumer preferences, inadequate supply of essential inputs, changes in governmental policies, and so on. Often, of course, the principal factor may be inept and incompetent management. The poor business performance definitely affects the interest of equity shareholders, who have a residual claim on the income and wealth of the firm. It can also affect the interest of debenture holders if the ability of the firm to meet its interest and principal payment obligation is impaired. In such a case, debenture holders face the prospect of default risk.

**Interest Rate Risk** The changes in interest rate have a bearing on the welfare of investors. As the interest rate goes up, the market prices of existing fixed income securities fall, and vice versa. This happens because the buyer of a fixed income security would not buy it at its par value or face value if its fixed interest rate is lower than the prevailing interest rate on a similar security. For example, a debenture that has a face value of ₹ 100 and a fixed rate of 12 percent will sell at a discount if the interest rate moves up from, say, 12 percent to 14 percent. While the changes in interest rate have a direct bearing on the

prices of fixed income securities, they affect equity prices too, albeit somewhat indirectly. The changes in the relative yields of debentures and equity shares influence equity prices.

**Market Risk** Even if the earning power of the corporate sector and the interest rate structure remain more or less unchanged, prices of securities, equity shares in particular, tend to fluctuate. While there can be several reasons for this fluctuation, a major cause appears to be the changing sentiment of the investors. There are periods when investors become bullish and their investment horizons lengthen. Investor optimism, which may border on euphoria during such periods, drives share prices to great heights. The buoyancy created in the wake of this development is pervasive, affecting almost all the shares. On the other hand, when a wave of pessimism (which often is an exaggerated response to some unfavourable political or economic development) sweeps the market, investors turn bearish and myopic. Prices of equity shares register decline as fear and uncertainty pervade the market.

The market tends to move in cycles. An John Train says "You need to get deeply into your bones the sense that any market, and certainly the stock market, moves in cycles, so that you will infallibly get wonderful bargains every few years, and have a chance to sell again at ridiculously high prices a few years later."<sup>1</sup>

The cycles are caused by mass psychology. As John Train explains: "The ebb and flow of mass emotion is quite regular: Panic is followed by relief, and relief by optimism; then comes enthusiasm, then euphoria and rapture, then the bubble bursts, and public feeling slides off again into concern, desperation, and finally a new panic."

One would expect large scale participation of institutions to dampen the price fluctuations in the market. After all, institutional investors have core professional expertise to do fundamental analysis and greater financial resources to act on fundamental analysis. However, nothing of this kind has happened. On the contrary, price fluctuations seem to have become wider after the arrival of institutional investors in larger numbers.

Why? Perhaps the institutions and their analysts have not displayed more prudence and rationality than the general investing public and have succumbed in equal measure to the temptation to speculate. As John Maynard Keynes had argued, factors that contribute to the volatility of the market are not likely to diminish when expert professionals supposedly possessing better judgment and knowledge compete in the market place. According to Keynes, even these people are concerned with *speculation* (the activity of forecasting the psychology of the market) and not *enterprise* (the activity of forecasting the prospective yield of assets over their whole life).

**Types of Risk** Modern portfolio theory looks at risk from a different perspective. It divides total risk as follows.

$$\text{Total risk} = \text{Unique risk} + \text{Market risk}$$

The *unique* risk of a security represents that portion of its total risk which stems from firm-specific factors like the development of a new product, a labour strike, or the emergence of a new competitor. Events of this nature primarily affect the specific firm and not all firms in general. Hence, the unique risk of a stock can be washed away by combining it with other

<sup>1</sup> John Train, *The Money Masters*, New York: Harper and Row Publishers, Inc., 1981.

stocks. In a diversified portfolio, unique risks of different stocks tend to cancel each other—a favourable development in one firm may offset an adverse happening in another and vice versa. Hence, unique risk is also referred to as diversifiable risk or unsystematic risk.

The market risk of a security represents that portion of its risk which is attributable to economy-wide factors like the growth rate of GDP, the level of government spending, money supply, interest rate structure, and inflation rate. Since these factors affect all firms to a greater or lesser degree, investors cannot avoid the risk arising from them, however diversified their portfolios may be. Hence, it is also referred to as systematic risk (as it affects all securities) or non-diversifiable risk.

### 5.3 MEASURING HISTORICAL RETURN

The total return on an investment for a given period is:

$$\text{Total return} = \frac{\text{Cash payment received during the period} + \text{Price change over the period}}{\text{Price of the investment at the beginning}}$$

All items are measured in rupees. The rupee cash payment received during the period may be positive or zero. The rupee price change over the period is simply the difference between the ending price and the beginning price. This can be positive (ending price exceeds the beginning price) or zero (ending price equals the beginning price) or negative (ending price is less than the beginning price).

In formal terms

$$R = \frac{C + (P_E - P_B)}{P_B} \quad (5.1)$$

where  $R$  is the total return over the period,  $C$  is the cash payment received during the period,  $P_E$  is the ending price of the investment, and  $P_B$  is the beginning price.

To illustrate, consider the following information for an equity stock:

- Price at the beginning of the year : ₹ 60.00
- Dividend paid at the end of the year : ₹ 2.40
- Price at the end of the year : ₹ 69.00

The total return on this stock is calculated as follows:

$$\frac{2.40 + (69.00 - 60.00)}{60.00} = 0.19 \text{ or } 19 \text{ percent}$$

It is helpful to split the total return into two components, viz., current yield and capital gains/loss yield as follows:

$$\underbrace{\frac{\text{Cash payment}}{\text{Beginning price}}}_{\text{Current return}} + \underbrace{\frac{\text{Ending price} - \text{Beginning price}}{\text{Beginning price}}}_{\text{Capital return}}$$

The total return of 19 percent in our example may be broken down as follows

$$\frac{2.40}{60.00} + \frac{69.00 - 60.00}{60.00} = \frac{4 \text{ percent}}{\text{Current return}} + \frac{15 \text{ percent}}{\text{Capital return}}$$

Thus, the total return concept is all-inclusive (as it includes the current yield as well as the price change) and measures the total return per rupee of original investment. Hence it can be used for comparing investment returns over a specified period.

**Return Relative** Often it is necessary to measure returns in a slightly different manner. This is particularly true when a cumulative wealth index or a geometric mean has to be calculated, because in such calculations negative returns cannot be used. The concept of *return relative* is used in such cases. The *return relative* is defined as:

$$\text{Return relative} = \frac{C + P_E}{P_B} \quad (5.2)$$

Put differently

Return relative = 1 + Total return in decimals

In our example the return relative is:  $1 + 0.19 = 1.19$

Note that even though the total return may be negative, the return relative cannot be negative. At worst it is zero.

**Cumulative Wealth Index** A return measure like total return reflects changes in the level of wealth. For some purposes it is more useful to measure the level of wealth (or price) rather than the change in the level of wealth. To do this, we must measure the cumulative effect of returns over time, given some stated initial amount, which is typically one rupee.

The cumulative wealth index captures the cumulative effect of total returns. It is calculated as follows:

$$CWI_n = WI_0 (1 + R_1) (1 + R_2) \dots (1 + R_n) \quad (5.3)$$

where  $CWI_n$  is the cumulative wealth index at the end of  $n$  years,  $WI_0$  is the beginning index value which is typically one rupee and  $R_i$  is the total return for year  $i$  ( $i = 1, \dots, n$ ).

To illustrate, consider a stock which earns the following returns over a five year period:  $R_1 = 0.14$ ,  $R_2 = 0.12$ ,  $R_3 = -0.08$ ,  $R_4 = 0.25$ , and  $R_5 = 0.02$ .

The cumulative wealth index at the end of the five year period, assuming a beginning index value of one rupee, is:

$$CWI_5 = 1 (1.14) (1.12) (0.92) (1.25) (1.02) = 1.498$$

Thus, one rupee invested at the beginning of year 1 would be worth ₹ 1.498 at the end of year 5.

You can use the values for the cumulative index to obtain the total return for a given period, using the following equation:

$$R_n = \frac{CWI_n}{CWI_{n-1}} - 1 \quad (5.3a)$$

where  $R_n$  is the total return for period  $n$  and  $CWI$  is the cumulative wealth index.

## Summary

- For earning returns investors have to almost invariably bear some risk. While investors like returns they abhor risk. Investment decisions therefore involve a tradeoff between risk and return.
- The **total return** on an investment for a given period is:

$$R = \frac{C + (P_E - P_B)}{P_B}$$

- The **return relative** is defined as:

$$\text{Return relative} = \frac{C + P_E}{P_B}$$

- The **cumulative wealth index** captures the cumulative effect of total returns. It is calculated as follows:

$$CWI_n = WI_0 (1 + R_1) (1 + R_2) \dots (1 + R_n)$$

- The **arithmetic mean** of a series of returns is defined as:

$$\bar{R} = \frac{\sum_{i=1}^n R_i}{n}$$

- The **geometric mean** of a series of returns is defined as:

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

- The **real return** is defined as:

$$\frac{1 + \text{Nominal return}}{1 + \text{Inflation rate}} - 1$$

- The **standard deviation** of a historical series of returns is calculated as follows:

$$\sigma = \left( \frac{\sum_{i=1}^n (R_i - \bar{R})^2}{n-1} \right)^{1/2}$$

- There are three well known risk premiums: equity risk premium, bond horizon premium, and bond default premium.
- The expected rate of return on a stock is:

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