UNIT I- INVESTMENT SETTINGS

Financial and economic meaning of Investment-Characteristics and objectives of Investment -Types of Investment-Investment alternatives-Choice and Evaluation-Risk and return concepts.

INVESTMENT

Investment is the employment of funds with the aim of getting return on it. In general terms, investment means the use of money in the hope of making more money. In finance, investment means the purchase of a financial product or other item of value with an expectation of favourable future returns. Investment of hard earned money is a crucial activity of every human being. Investment is the commitment of funds which have been saved from current consumption with the hope that some benefits will be received in future. Thus, it is a reward for waiting for money. Savings of the people are invested in assets depending on their risk and return demands. Investment refers to the concept of deferred consumption, which involves purchasing an asset, giving a loan or keeping funds in a bank account with the aim of generating future returns. Various investment options are available, offering differing risk-reward tradeoffs. An understanding of the core concepts and a thorough analysis of the options can help an investor create a portfolio that maximizes returns while minimizing risk exposure.

There are two concepts of Investment**:**

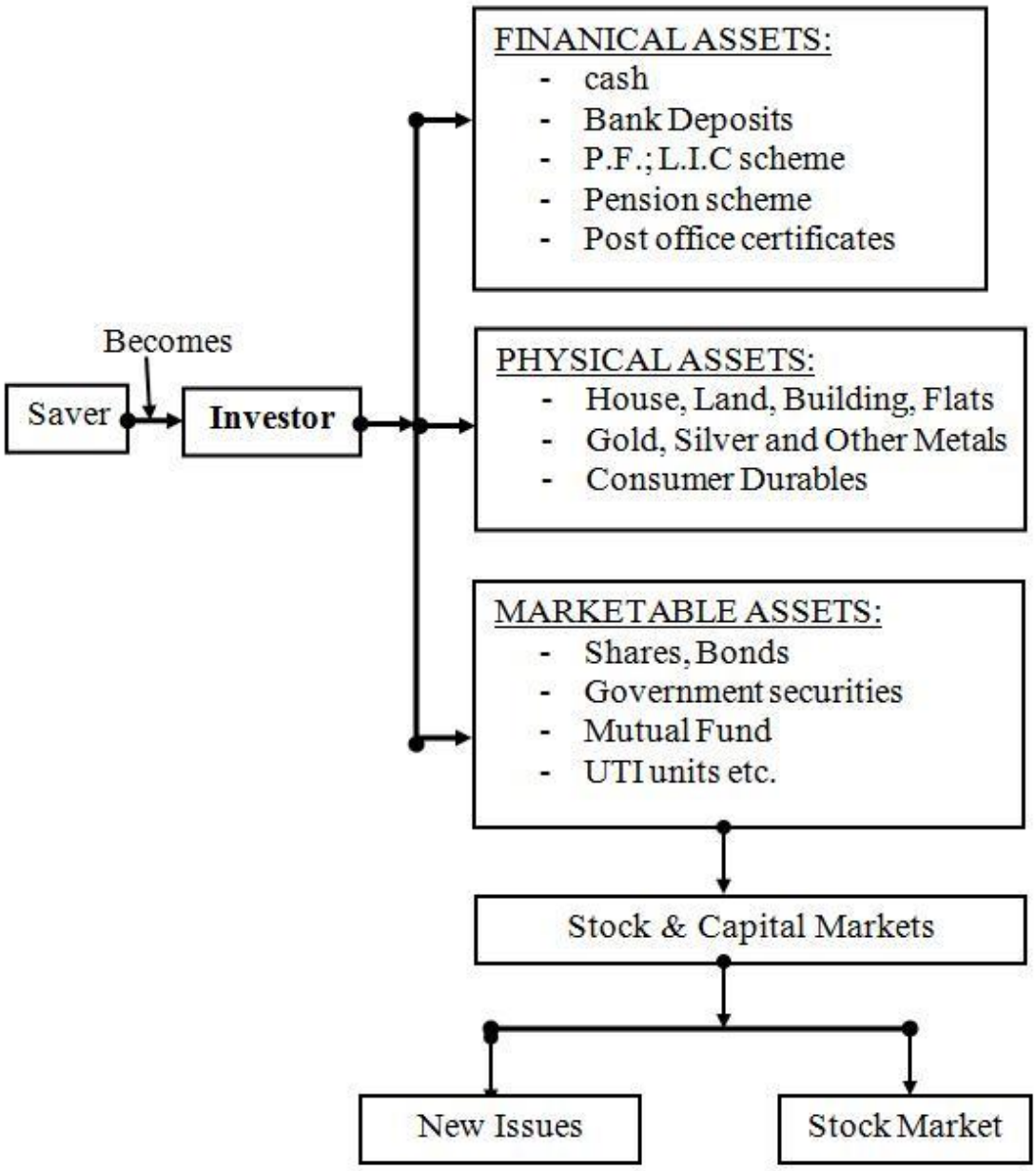
1) Economic Investment: The concept of economic investment means addition to the capital stock of the society. The capital stock of the society is the goods which are used in the production of other goods. The term investment implies the formation of new and productive capital in the form of new construction and producers' durable instrument such as plant and machinery. Inventories and human capital are also included in this concept. Thus, an investment, in economic terms, means an increase in building, equipment, and inventory.

2) Financial Investment: This is an allocation of monetary resources to assets that are expected to yield some gain or return over a given period of time. It means an exchange of financial claims such as shares and bonds, real estate, etc. Financial investment involves contrasts written on pieces of paper such as shares and debentures. People invest their funds in shares, debentures, fixed deposits, national saving certificates, life insurance policies, provident fund etc. in their view investment is a commitment of funds to derive future income in the form of interest, dividends, rent, premiums, pension benefits and the appreciation of the value of their principal capital. In primitive economies most investments are of the real variety whereas in a modern economy much investment is of the financial variety.

The economic and financial concepts of investment are related to each other because investment is a part of the savings of individuals which flow into the capital

market either directly or through institutions. Thus, investment decisions and financial decisions interact with each other. Financial decisions are primarily concerned with the sources of money where as investment decisions are traditionally concerned with uses or budgeting of money.

So from above we know the term investment. The savers become the investors in the following term and invest in unique assets:



Other definitions for investment:

“Investment may be defined as the purchase by an individual or institutional investor of a financial or real asset that produces a return proportional to the risk assumed over some future investment period.” – F. Amling

"Investment defined as commitment of funds made in the expectation of some positive rate of return. If the investment is properly undertaken, the return will commensurate with the risk the investor assumes."- Fisher & Jordan

Investment refers to acquisition of some assets. It also means the conversion of money into claims on money and use of funds for productive income earnings assets. In essence, it means the use of funds for productive purpose, for securing some objectives like, income, appreciation of capital or capital gains, or for further production of goods and services with the objective of securing yield

Speculation Vs. Gambling

1. Purpose:

- Speculation is undertaken with a view to protecting against future fluctuations (in securities' prices) and to make profit out of the price-differentials.
- Gambling on the other hand, is undertaken solely with a view to making profits on price movements.

2. Degree of Risk:

- Speculation is based on the scientific analysis of market conditions. Accordingly, it is a calculated risk.
- On the other hand, gambling involves blind chance-taking. Therefore, it comprises total risk.

3. Basis of Decisions:

- Foresight is the basis of speculation decisions. Speculation proper is based on scientific knowledge of business conditions and proper forecasting.
- Gambling is purely an exercise in chance and is undertaken blindly and ignorantly. There is no objective knowledge of business conditions under gambling.

4. Utility:

- Genuine speculation is a useful activity. It helps in ironing out price fluctuations and thus, builds investors' confidence. In this manner, good speculation is socially desirable.
- Gambling is harmful to the community as it victimizes investors by causing violent fluctuations in securities' prices.
- Healthy speculation tends to iron out price fluctuations, whereas gambling only accentuates these fluctuations.

5. Legality:

- There is no legal restriction on speculation. It is a legally permissible activity because it is a valuable economic service.

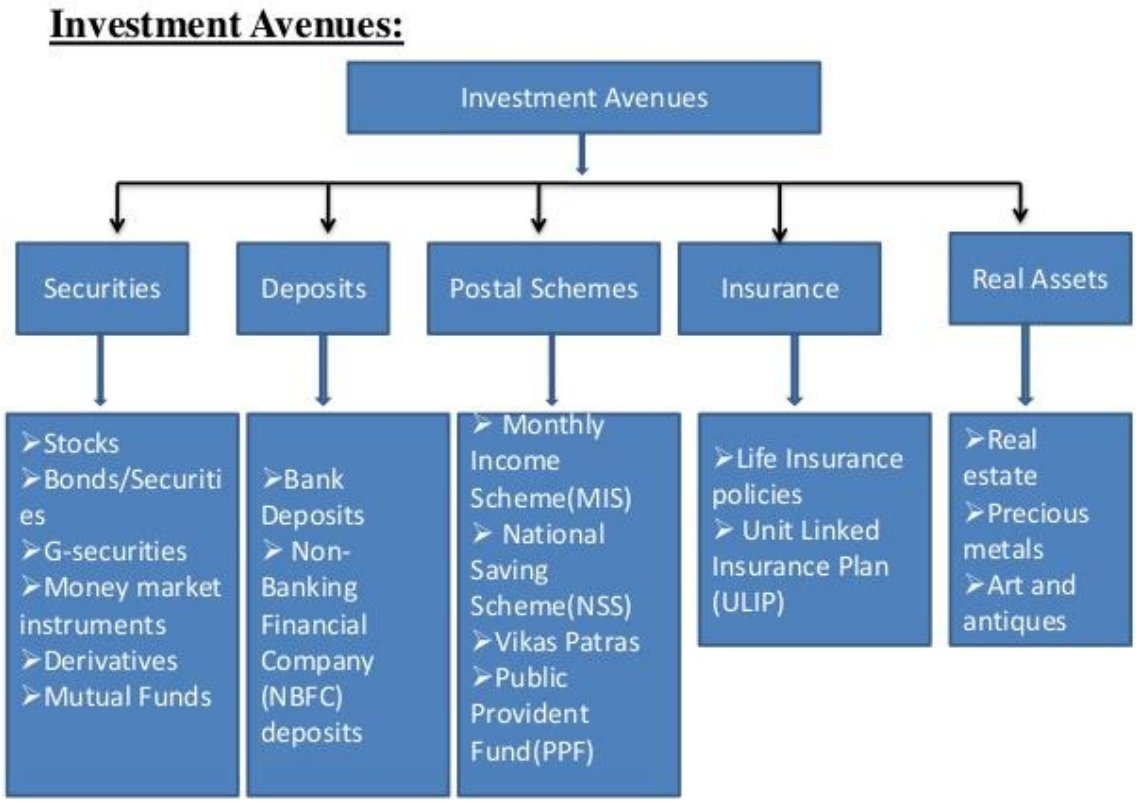
- Gambling, on the other hand, is unsocial, unhealthy and illegal.

6. Physical Transfer of Securities:

- Speculation may involve physical transfer of securities or it may be merely a trading on price-differences.

- Gambling, however, never involves physical transfer of actual possession. It aims at reaping profit solely on price movements.

INVESTMENT ALTERNATIVES



Different avenues and alternatives of investment include share market, debentures or bonds, money market instruments, mutual funds, life insurance, real estate, precious objects, derivatives, non-marketable securities. All are differentiated based on their different features in terms of risk, return, term etc.

Investment in any of the alternatives depends on the needs and requirements of the investor. Corporates and individuals have different needs. Before investing, these alternatives of investments need to be analyzed in terms of their risk, return, term, convenience, liquidity etc.

EQUITY SHARES

Equity investments represent ownership in a running company. By ownership, we mean share in the profits and assets of the company but generally, there are no fixed returns. It is considered as a risky investment but at the same time, depending upon situation, it is liquid investments due to the presence of stock markets. There are equity shares for which there is a regular trading, for those investments liquidity is more otherwise for stocks have less movement, liquidity is not highly attractive. Equity shares of companies can be classified as follows:

- Blue chip scrip
- Growth scrip
- Income scrip
- Cyclical scrip
- Speculative scrip

DEBENTURES OR BONDS

Debentures or bonds are long-term investment options with a fixed stream of cash flows depending on the quoted rate of interest. They are considered relatively less risky. An amount of risk involved in debentures or bonds is dependent upon who the issuer is. For example, if the issue is made by a government, the risk is assumed to be zero. However, investment in long term debentures or bonds, there are risk in terms of interest rate risk and price risk. Suppose, a person requires an amount to fund his child's education after 5 years. He is investing in a debenture having maturity period of 8 years, with coupon payment annually. In that case there is a risk of reinvesting coupon at a lower interest rate from end of year 1 to end of year 5 and there is a price risk for increase in rate of interest at the end of fifth year, in which price of security falls. In order to immunize risk, investment can be made as per duration concept. Following alternatives are available under debentures or bonds:

- Government securities
- Savings bonds
- Public Sector Units bonds
- Debentures of private sector companies
- Preference shares

MONEY MARKET INSTRUMENTS

Money market instruments are just like the debentures but the time period is very less. It is generally less than 1 year. Corporate entities can utilize their idle working capital by investing in money market instruments. Some of the money market instruments are

- Treasury Bills
- Commercial Paper
- Certificate of Deposits

MUTUAL FUNDS

Mutual funds are an easy and tension free way of investment and it automatically diversifies the investments. A mutual fund is an investment only in debt or only in

equity or mix of debts and equity and ratio depending on the scheme. They provide with benefits such as professional approach, benefits of scale and convenience. Further investing in mutual fund will have advantage of getting professional management services, at a lower cost, which otherwise was not possible at all. In case of open ended mutual fund scheme, mutual fund is giving an assurance to investor that mutual fund will give support of secondary market. There is an absolute transparency about investment performance to investors. On real time basis, investors are informed about performance of investment. In mutual funds also, we can select among the following types of portfolios:

- Equity Schemes
- Debt Schemes
- Balanced Schemes
- Sector Specific Schemes etc.

LIFE INSURANCE AND GENERAL INSURANCE

They are one of the important parts of good investment portfolios. Life insurance is an investment for the security of life. The main objective of other investment avenues is to earn a return but the primary objective of life insurance is to secure our families against unfortunate event of our death. It is popular in individuals. Other kinds of general insurances are useful for corporates. There are different types of insurances which are as follows:

- Endowment Insurance Policy
- Money Back Policy
- Whole Life Policy
- Term Insurance Policy
- General Insurance for any kind of assets.

REAL ESTATE

Every investor has some part of their portfolio invested in real assets. Almost every individual and corporate investor invest in residential and office buildings respectively. Apart from these, others include:

- Agricultural Land
- Semi-Urban Land
- Commercial Property
- Raw House
- Farm House etc

PRECIOUS OBJECTS

Precious objects include gold, silver and other precious stones like the diamond. Some artistic people invest in art objects like paintings, ancient coins etc.

DERIVATIVES

Derivatives means indirect investments in the assets. The derivatives market is growing at a tremendous speed. The important benefit of investing in derivatives is that it leverages the investment, manages the risk and helps in doing speculation. Derivatives include:

- Forwards
- Futures
- Options
- Swaps etc

NON-MARKETABLE SECURITIES

Non-marketable securities are those securities which cannot be liquidated in the financial markets. Such securities include:

- Bank Deposits
- Post Office Deposits
- Company Deposits
- Provident Fund Deposits

Objectives of Investment

The options for investing savings are continually increasing, yet every investment vehicle can be categorized according to three fundamental characteristics: safety, income, and growth.

Those options also correspond to investor objectives. While an investor may have more than one of these objectives, the success of one comes at the expense of others. We examine these three types of objectives, the investments used to achieve them, and the ways investors can incorporate them into a strategy.

Safety

There is truth to the axiom that there is no such thing as a completely safe and secure investment. However, we can get close to ultimate safety for our investment funds through the purchase of government-issued securities in stable economic systems or through the purchase of corporate bonds issued by large, stable companies. Such securities are arguably the best means of preserving principal while receiving a specified rate of return.

Income

The safest investments are those likely to have the lowest rate of income return or yield. Investors must inevitably sacrifice a degree of safety if they want to increase their yields. As yield increases, so does the risk.

To increase their rate of investment return and take on risk above that of money market instruments or government bonds, investors may choose to

purchase corporate bonds or preferred shares with lower investment ratings. Investment grade bonds rated at A or AA are slightly riskier than AAA bonds but typically also offer a higher income return than AAA bonds. Similarly, BBB-rated bonds carry medium risk, but they offer less potential income than junk bonds, which offer the highest potential bond yields available but at the highest possible risk. Junk bonds are the most likely to default.

Most investors, even the most conservative-minded ones, want some level of income generation in their portfolios, even if it is just to keep up with the economy's rate of inflation. But maximizing income return can be an overarching principle for a portfolio, particularly for individuals who require a fixed sum from their portfolio every month. A retired person who requires a certain amount of money every month is well served by holding reasonably safe assets that provide funds over and above other income-generating assets, such as pension plans.

Capital Growth

This discussion has thus far been concerned only with safety and yield as investment objectives and has not considered the potential of other assets to provide a rate of return from an increase in value, often referred to as a capital gain.

Capital gains are entirely different from yield in that they are only realized when the security is sold for a price that is higher than the price at which it was originally purchased. Selling at a lower price is referred to as a capital loss. Therefore, investors seeking capital gains are likely not those who need a fixed, ongoing source of investment returns from their portfolio, but rather those who seek the possibility of longer-term growth.

Capital growth is most closely associated with the purchase of common stock, particularly growth securities, which offer low yields but a considerable opportunity for an increase in value. For this reason, common stock ranks among the most speculative of investments as the return depends on what will happen in an unpredictable future. Blue-chip stocks can potentially offer the best of all worlds by possessing reasonable safety, modest income, and potential for capital growth generated by long-term increases in corporate revenues and earnings as the company matures. Common stock is rarely able to provide the safety and income generation of government bonds.

Secondary Objectives

Tax Minimization: An investor may pursue certain investments to leverage tax minimization as part of their investment strategy. A highly paid executive, for example, may seek investments with favourable tax treatment to lessen his or her overall income tax burden. Making contributions to an IRA or another

tax-sheltered retirement plan, such as a 401(k), can be an effective tax minimization strategy.

Marketability/Liquidity: Many of the investments we have discussed are reasonably illiquid, which means they cannot be immediately sold and easily converted into cash. Achieving a degree of liquidity, however, requires the sacrifice of a certain level of income or potential for capital gains.

Common stock is often considered the most liquid of investments because it can be sold within a day or two. Bonds are also marketable, but some bonds are highly illiquid or non-tradable with a fixed term. Similarly, money market instruments may only be redeemable at the precise date at which the fixed term ends. If an investor seeks liquidity, money market assets and non-tradable bonds are not likely to be held in their portfolio.

Types of Investment

1. Financial Investment
    - ❖ Cash
    - ❖ Bank deposits
    - ❖ Pension plans
    - ❖ Provident Funds
    - ❖ Insurance policies
2. Physical Investment
    - ❖ Land & Buildings, Flats, Metals like Gold, etc,
3. Marketable investment
    - ❖ Shares, bonds, Mutual funds, Govt. Securities, etc.,

Types of investment can also be classified as below:

Growth investments

These are more suitable for long term investors that are willing and able to withstand market ups and downs.

Shares

Shares are considered a growth investment as they can help grow the value of your original investment over the medium to long term.

If you own shares, you may also receive income from dividends, which are effectively a portion of a company's profit paid out to its shareholders.

Of course, the value of shares may also fall below the price you pay for them. Prices can be volatile from day to day and shares are generally best suited to long term investors, who are comfortable withstanding these ups and downs.

Also known as equities, shares have historically delivered higher returns than other assets, shares are considered one of the riskiest types of investment.

Property

Property is also considered as a growth investment because the price of houses and other properties can rise substantially over a medium to long term period.

However, just like shares, property can also fall in value and carries the risk of losses.

It is possible to invest directly by buying a property but also indirectly, through a property investment fund.

Defensive investments

These are more focused on consistently generating income, rather than growth, and are considered lower risk than growth investments.

Cash

Cash investments include everyday bank accounts, high interest savings accounts and term deposits.

They typically carry the lowest potential returns of all the investment types.

While they offer no chance of capital growth, they can deliver regular income and can play an important role in protecting wealth and reducing risk in an investment portfolio.

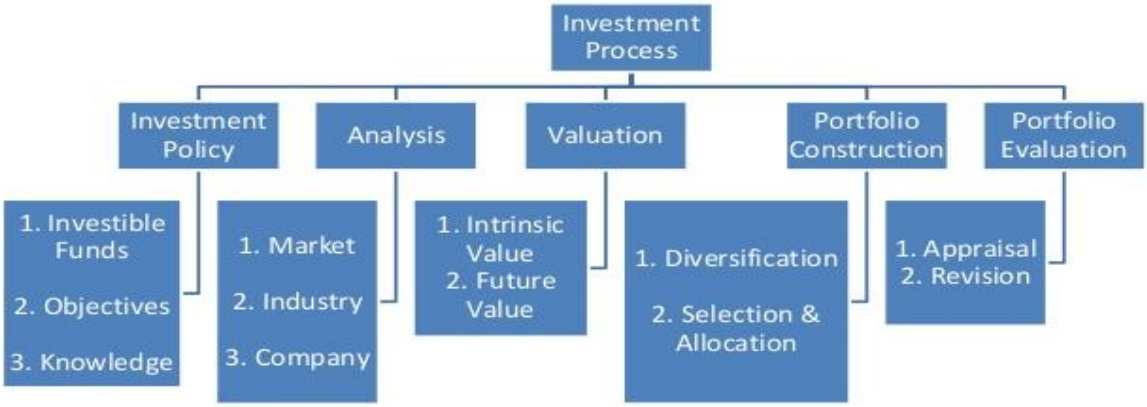
Fixed interest

The best known type of fixed interest investments are bonds, which are essentially when governments or companies borrow money from investors and pay them a rate of interest in return.

Bonds are also considered as a defensive investment, because they generally offer lower potential returns and lower levels of risk than shares or property.

They can also be sold relatively quickly, like cash, although it's important to note that they are not without the risk of capital losses.

INVESTMENT PROCESS



1. ***Investment Policy:***

The first stage determines and involves personal financial affairs and objectives before making investments. It may also be called preparation of the investment policy stage.

The investor has to see that he should be able to create an emergency fund, an element of liquidity and quick convertibility of securities into cash. This stage may, therefore; be considered appropriate for identifying investment assets and considering the various features of investments.

2. ***Investment Analysis:***

When an individual has arranged a logical order of the types of investments that he requires on his portfolio, the next step is to analyse the securities available for investment. He must make a comparative analysis of the type of industry, kind of security and fixed vs. variable securities. The primary concerns at this stage would be to form beliefs regarding future behaviour or prices and stocks, the expected returns and associated risk.

3. ***Valuation of Securities:***

The third step is perhaps the most important consideration of the valuation of investments. Investment value, in general, is taken to be the present worth to the owners of future benefits from investments. The investor has to bear in mind the value of these investments.

An appropriate set of weights have to be applied with the use of forecasted benefits to estimate the value of the investment assets. Comparison of the value with the current market price of the asset allows a determination of the relative attractiveness of the asset. Each asset must be valued on its individual merit. Finally, the portfolio should be constructed.

4. ***Portfolio Construction:***

Under features of an investment programme, portfolio construction requires a knowledge of the different aspects of securities. These are briefly recapitulated here, consisting of safety and growth of principal, liquidity of assets after taking into account the stage involving investment timing, selection of investment, and allocation of savings to different investments and feedback of portfolio. While evaluating securities, the investor should realize that investments are made under conditions of uncertainty. These cannot be a magic formula which will always work. The investor should be concerned with concepts and applications that will satisfy his investment objectives and constantly evaluate the performance of his investments. If need be, the investor may consider switching over to alternate proposals.

5. ***Portfolio Evaluation***

This is the last step of the investment process. The securities included in the portfolio may not perform as predicted or may not satisfy the investing objectives. Therefore, an investor should make periodic evaluation of the performance of the portfolio against the investment objectives. Some securities in the portfolio which stood attractive may no longer be so attractive. Thus, investors should delete such securities from the portfolio and add new ones that are attractive. Thus evaluating and revising is an ongoing process.

Risk & Return Concept

Risk & Return of a Single Asset

The typical object of investment is to make **current income from investments in the form of dividends and interest income.** The investments should earn reasonable and expected rate of return on investments. Certain investments like bank deposits, public deposits, debentures, bonds etc. will carry a fixed rate of return payable periodically.

In case of investments in shares of companies, the periodical payments in the form of dividends are not assured, but it may ensure higher returns than fixed income investments. But the investments in equity shares of companies carry higher risk than fixed income instruments.

Another form of return is in the form of capital appreciation. This element of **return is the difference between the purchase price and the price at which the asset can be sold, it can be a capital gain or capital loss arising due to change in the price of the investment.**

The rate of return of a particular investment is calculated as follows:

Annual Rate of Return:

The annual rate of return of a particular investment can be calculated as follows:

$$R = \frac{D_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{D_1 + (P_1 - P_0)}{P_0}$$

Where, R = Annual rate of return of a share

D_1 = Dividend paid at the end of the year

P_0 = Market price of share at the beginning of the year

P_1 = Market price of share at the end of the year

The above formula is used for calculation of annual return of an investment in shares. In the above formula, D_1/P_0 represents dividend yield and $(P_1 – P_0)/P_0$ represents capital gain or loss.

Problem 1:

Mr. Ravi has purchased 100 shares of Rs.10 each of Radheshyam Ltd. in 2013 at Rs.78 per share. The company has declared a dividend @ 40% for the year 2015-16. The market price of share as at 1-4-2015 was Rs.104 and on 31-3-2016 was Rs.128. Calculate the annual return on the investment for the year 2015-16.

Solution:

Dividend received for 2015-16 = Rs.10 x 40/100 = Rs.4

Calculation of Annual Rate of Return on Investment for the Year 2015-16:

$$R = \frac{D_1 + (P_1 - P_0)}{P_0} = \frac{4 + (128 - 104)}{104} = 0.2692 \text{ or } 26.92\%$$

Average Rate of Return:

The rate of return can also be calculated for a period more than one year. The average rate of return represents the average of annual rates of return over a period of years.

The formula used for calculation of average rate of return is given below:

$$\bar{R} = \frac{1}{n}(R_1 + R_2 + \ldots . R_n)$$

Where, $\bar{R}$ = Average rate of return

R_1, R_2 …..R_n = Annual rate of return in period 1, 2,…..

n = Total number of periods

Problem 2:

The average market prices and dividend per share of High-Tech Securities Ltd. for the past 6 years are given below:

Year	Average market price (₹)	Dividend per share (₹)
2015-16	68	3.0
2014-15	61	2.6
2013-14	50	2.0
2012-13	53	2.5
2011-12	45	2.0
2010-11	38	1.8

Calculate the average rate of return of High Tech Securities Ltd. Shares for past 6 years.

Solution:

Year	Average market price per share (₹)	Capital gain (%)	Dividend per share (₹)	Dividend yield (%)	Rate of return (%)
2010-11	38	-	1.8	4.74	-
2011-12	45	18.42	2.0	4.44	22.86
2012-13	53	17.78	2.5	4.72	22.50
2013-14	50	-5.66	2.0	4.00	-1.66
2014-15	61	22.00	2.6	4.26	26.26
2015-16	68	11.48	3.0	4.41	15.89

$$\bar{R} = \frac{1}{5}(22.86 + 22.50 - 1.66 + 26.26 + 15.89) = \frac{1}{5}(85.85) = 17.17\%$$

Working Notes:

2010-2011- Dividend Yield = $\frac{1.8}{38} \times 100 = 4.74\%$

2011-12 – Capital Gain = $\frac{(45-38)}{38} \times 100 = 18.42\%$

2011-12 – Dividend Yield = $\frac{2}{45} \times 100 = 4.44\%$

2011-12 – Annual ROR = 18.42% + 4.44% = 22.86%

Risk on Single Asset:

The concept of risk is more difficult to quantify. **Statistically we can express risk in terms of standard deviation of return**. For example, in case of gilt edged security or government bonds, the risk is nil since the return does not vary – it is fixed. But strictly speaking if we

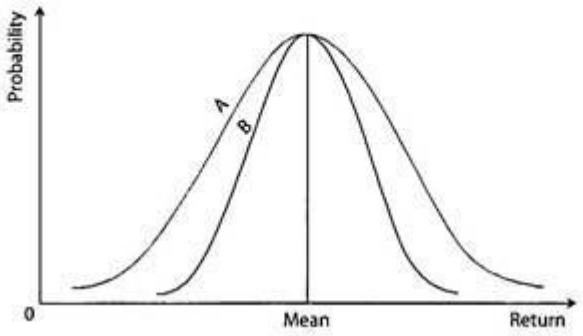
consider inflation and calculate real rate of return (inflation adjusted) we find that even government bonds have some amount of risk since the rate of inflation may vary.

Return from unsecured fixed deposits appear to have zero variability and hence zero risk. But there is a risk of default of interest as well as the principal. In such case the rate of return can be negative. Hence, this investment has high risk though apparently it carries zero risk. For other **investments like shares, business etc., where the rate of return is not fixed, there may be a schedule of return with associated probability for each rate of return.**

The mean of the probable returns gives the expected rate of return and the standard deviation or variance which is square of standard deviation measures risk. Higher the range of the probable return, **higher the standard deviation and hence higher the risk. A risk averse investor will look for return where the range is low. Hence, low standard deviation means low risk.**

The problem in portfolio management is to minimize the standard deviation without sacrificing expected rate of return. This is possible by diversification. Risk is measured in terms of variability of returns. If Investment 'A' and Investment 'B' whose mean rate of return is same as shown in figure 3.9.

FIGURE 3.9 VARIABILITY OF RETURN



The returns of Investment 'A' show more variability than Investment 'B'. In view of the variability of returns, Investment 'A' is more risky, even though both the investments are having the same mean returns. The following illustrations explains the quantification of risk in terms of standard deviation.

Problem 3:

The rate of return of equity shares of Karan Steels Ltd. for past six years are given below:

Year	2011	2012	2013	2014	2015	2016
Rate of return (%)	12	18	-6	20	22	24

Calculate the average rate of return, standard deviation and variance.

Solution:

Calculation of Average Rate of Return ($\bar{R}$):

$$\bar{R} = \frac{\Sigma R}{N} = \frac{12+18-6+20+22+24}{6} = 15\%$$

$$\sigma^2 = \frac{\Sigma(R-\bar{R})^2}{N}$$

Year	Rate of Return (%) R	$(R - \bar{R})$	$(R - \bar{R})^2$
2011	12	-3	9
2012	18	3	9
2013	-6	-21	441
2014	20	5	25
2015	22	7	49
2016	24	9	81
			$\Sigma(R - \bar{R})^2 = 614$

$$Variance(\sigma^2) = \frac{614}{6} = 102.33$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{Variance} = \sqrt{102.33} = 10.12\%$$

Risk and Return of a Portfolio

So far our analysis of risk-return was confined to single assets held in isolation. In real world, we rarely find investors putting their entire wealth into single asset or investment. Instead they build portfolio of investments and hence risk-return analysis is extended in context of portfolio.

A portfolio is composed of two or more securities. Each portfolio has risk-return characteristics of its own. A portfolio comprising securities that yield a maximum return for given level of risk or minimum risk for given level of return is termed as 'efficient portfolio'. In their Endeavour to strike a golden mean between risk and return the traditional portfolio managers diversified funds over securities of large number of companies of different industry groups.

However, this was done on intuitive basis with no knowledge of the magnitude of risk reduction gained. Since the 1950s, however, a systematic body of knowledge has been built up which quantifies the expected return and riskiness of the portfolio. These studies have collectively come to be known as 'portfolio theory'.

i. Portfolio Return:

The expected return of a portfolio represents weighted average of the expected returns on the securities comprising that portfolio with weights being the proportion of total funds invested in each security (the total of weights must be 100).

The following formula can be used to determine expected return of a portfolio:

$$\bar{R}p = \sum_{j=1} Wj\,Rj \qquad \ldots(5.5)$$

where $\bar{R}$ = Expected return of a portfolio

$\bar{P}$ = The proportion, or weights of total funds invested in security j

Rj = The expected return for security j

m = The total number of different securities in the portfolio

Applying formula (5.5) to possible returns for two securities with funds equally invested in a portfolio, we can find the expected return of the portfolio as below:

	Security X	Security Y
Expected Return, Rj	15.0%	12.6%
Standard deviation, 0j	10.7	1.5

The expected return of the portfolio is = (.5)15.0% + (.5)12.6 = 13.8%

ii. Portfolio Risk:

Unlike the expected return on a portfolio which is simply the weighted average of the expected returns on the individual assets in the portfolio, the portfolio risk, σp is not the simple, weighted average of the standard deviations of the individual assets in the portfolios.

It is for this fact that consideration of a weighted average of individual security deviations amounts to ignoring the relationship, or covariance that exists between the returns on securities. In fact, the overall risk of the portfolio includes the interactive risk of asset in relation to the others, measured by the covariance of returns. Covariance is a statistical measure of the degree to which two variables (securities' returns) move together. Thus, covariance depends on the correlation between returns on the securities in the portfolio.

Covariance between two securities is calculated as below:

1. Find the expected returns on securities.

2. Find the deviation of possible returns from the expected return for each security

3. Find the sum of the product of each deviation of returns of two securities and respective probability.

The formula for determining the covariance of returns of two securities is:

$$\text{COVAB} = \sum^{n} [RA - E(R_A)][R_B - E(R_B)] \times Pi \qquad \ldots(5.6)$$

where COVAB = The covariance of returns on securities A and B

R_A and R_B = Returns on securities A and B

$E(R_A)$ and $E(R_B)$ = Expected returns of A and B

Pi = Probability of occurrence of the state of economy

Let us explain the computation of covariance of returns on two securities with the help of the following illustration:

Table 5.3.

Covariance of Returns on Securities A and B

State of Economy	Probability	Returns		Deviations from Expected Returns		Product of deviation and probability
		A	B	A	B	
Highly Buoyant	0.1	–2	10	–10	5	–50
Buoyant	0.2	8	–5	6	–10	–120
Normal	0.3	6	4	4	–2	–2.4
Recession	0.2	4	10	0	6	0.0
Depression	0.2	–3	10	–8	12	–19.2
		$E(R_A)$3.8%		$E(R_B)$5.2%		Covar = – 38.6

So far as the nature of relationship between the returns of securities A and B is concerned, there may be three possibilities, viz., positive covariance, negative covariance and zero covariance. Positive covariance shows that on an average the two variables move together.

A's and B's returns could be above their average returns at the same time or they could be below their average returns at the same time. This signifies that as the proportion of high return and high risk assets is increased, higher returns on portfolio come with higher risk.

Negative covariance suggests that, on an average, the two variables move in opposite direction. It means A's returns could be above its average returns while B's return could be below its average returns and vice-versa. This implies that it is possible to combine the two securities A and B in a manner that will eliminate all risk.

Zero covariance means that the two variables do not move together either in positive or negative direction. In other words, returns on the two securities are not related at all. Such situation does not exist in real world. Covariance may be non-zero due to randomness and negative and positive terms may not cancel each other.

In the above example, covariance between returns on A and B is negative i.e., -38.6. This suggests that the two returns are negatively related.

The above discussion leads us to conclude that the riskiness of a portfolio depends much more on the paired security covariance than on the riskiness (standard deviations) of the separate security holdings. This means that a combination of individually risky securities could still comprise a moderate-to-low-risk portfolio as long as securities do not move in lock step with each other. In brief, low covariance's lead to low portfolio risk.

iii. Diversification:

Diversification is venerable rule of investment which suggests "Don't put all your eggs in one basket", spreading risk across a number of securities.

Diversification may take the form of unit, industry, maturity, geography, type of security and management. Through diversification of investments, an investor can reduce investment risks.

Investment of funds, say, Rs. 1 lakh evenly among as many as 20 different securities is more diversified than if the same amount is deployed evenly across 7 securities. This sort of security diversification is naive in the sense that it does not factor in the covariance between security returns.

The portfolio comprising 20 securities could represent stocks of one industry only and have returns which are positively correlated and high portfolio returns variability. On the other hand, the 7-stock portfolio might represent a number of different industries where returns might show low correlation and, hence, low portfolio returns variability.

Meaningful diversification is one which involves holding of stocks of more than one industry so that risks of losses occurring in one industry are counterbalanced by gains from the other industry. Investing in global financial markets can achieve greater diversification than investing in securities from a single country. This is for the fact that the economic cycles of different countries hardly synchronize and as such a weak economy in one country may be offset by a strong economy in another.

Fig. 5.2 portrays meaningful diversification. It may be noted from the figure that the returns overtime for Security X are cyclical in that they move in tandem with the economic fluctuations. In case of Security Y returns are moderately counter cyclical. Thus, the returns for these two securities are negatively correlated.

If equal amounts are invested in both securities, the dispersion of returns, up, on the portfolio of investments will be less because some of each individual security's variability is offsetting. Thus, the gains of diversification of investment portfolio, in the form of risk minimization, can be derived if the securities are not perfectly and positively correlated.

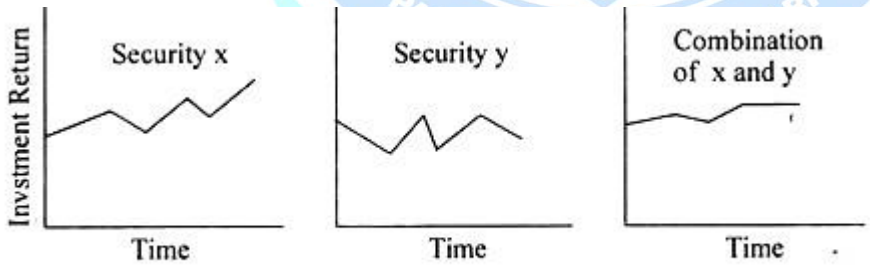


Fig. 5.2.

iv. Systematic and Unsystematic Risk:

Thus, the variance of returns on a portfolio moving in inverse direction can minimize portfolio risk. However, it is not possible to reduce portfolio risk to zero by increasing the number of securities in the portfolio. According to the research studies, when we begin with a single stock, the risk of the portfolio is the standard deviation of that one stock.

As the number of securities selected randomly held in the portfolio increase, the total risk of the portfolio is reduced, though at a decreasing rate. Thus, degree of portfolio risk can be

reduced to a large extent with a relatively moderate amount of diversification, say 15-20 randomly selected securities in equal-rupee amounts.

Portfolio risk comprises systematic risk and unsystematic risk. Systematic risk is also known as non- diversifiable risk which arises because of the forces that affect the overall market, such, as changes in the nation's economy, fiscal policy of the Government, monetary policy of the Central bank, change in the world energy situation etc.

Such types of risks affect securities overall and hence, cannot be diversified away. Even if an investor holds well diversified portfolio, he is exposed to this type of risk which is affecting the overall market. This is why, non-diversifiable or unsystematic risk is also termed as market risk which remains after diversification.

Another risk component is unsystematic risk. It is also known as diversifiable risk caused by such random events as law suits, strikes, successful and unsuccessful marketing programmes, winning or losing a major contract and other events that are unique to a particular firm.

Unsystematic risk can be eliminated through diversification because these events are random, their effects on individual securities in a portfolio cancel out each other. Thus, not all of the risks involved in holding a security are relevant because part of the risk can be diversified away. What is relevant for investors is systematic risk which is unavoidable and they would like to be compensated for bearing it. However, they should not expect the market to provide any extra compensation for bearing the avoidable risk, as is contended in the Capital Asset Pricing Model.

Figure 5.3 displays two components of portfolio risk and their relationship to portfolio size.

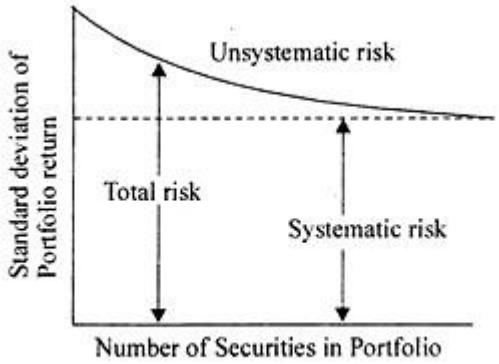


Fig. 5.3. Relationship of Total, Systematic and Unsystematic Risk to Portfolio size

Illustrative Problems:

1. An investor has two investment options before him. Portfolio A offers risk-free expected return of 10%. Portfolio B offers an expected return of 20% and has standard deviation of 10%. His risk aversion index is 5. Which investment portfolio the investor should choose?

Solution:

The following equation can be used to measure utility score of a portfolio:

$$U = E(r) - 0.005A\sigma^2$$

$$U(A) = 10 - 0.005 \times 5 \times (\sigma)^2 = 10 - 0 = 10\%$$

$$U(B) = 20 - 0.005 \times 5(10)^2 = 20 - 2.5 = 17.5\%$$

2. Companies X and Y have common stocks having the expected returns and standard deviations given below:

	X	Y
Expected return (Rj)	.10	.05
Standard deviation (0j)	.06	.04

The expected correlation coefficient between the two stocks is – 35.

You are required to calculate the risk and return for a portfolio comprising 60% invested in the stock of Company X and 40% invested in the stock of Company Y.

Solution:

(i) Rp = (.60)(.10) + (.40)(.06) = 8.4%

(ii) 0p = $[(.6)^2 (1.0)(.05)^2 + 2(.6)(.4)(-35)(.05)(.04) + (.4)^2 (1.0)(.04)^2)]^{1/2}$

= $[.00082)^{1/2}$ = 2.86%