

For any query on the subject, email at: messagerakesh@gmail.com



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Notes Prepared By:
RAKESH AGARWAL

M.Com, MBA, FIII

E-mail: messagerakesh@gmail.com

WhatsApp No: 8486118428

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Security Analysis & Portfolio Management

UNIT – 2

Q: What is a Portfolio?

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Ans:

A portfolio is the combination of different investments that constitute an investor's total holdings. A portfolio may be defined as a 'basket or combination of securities'.

The term 'portfolio' refers to the 'collection of assets', held by an individual or institution purely for investment purposes. The assets may be cash, financial assets (shares, debentures/ bonds, other securities), gold, paintings, antiques and real assets. The assets are held for investment purposes and not for 'consumption' purposes. The need to construct a portfolio arises because it is not desirable for any investor to invest all his funds in the individual security or asset. The investor wants to spread risks by diversification.

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Q: Write a short note on Portfolio Management?

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Ans:

Portfolio management refers to managing an individual's investments in the form of bonds, shares, cash, mutual funds etc. so that he earns the maximum profits within the stipulated time frame. It is the **art of selecting the right investment policy in terms of minimum risk and maximum return**. In a layman's language, the art of managing an individual's investment is called as portfolio management.

Portfolio management is planning one's portfolio as per risk-return profile and managing it efficiently so as to secure highest return for lowest risk at a particular level of investment. Basically, portfolio management involves a proper decision making as to what to purchase and what to sell.

Portfolio management is a dynamic concept and requires continuous and systematic analysis, judgement and operations. In this context, portfolio management may be defined as the process of construction, revision and evaluation of a portfolio to obtain maximum returns commensurate with the risk preference or tolerance of the investor. Thus, portfolio management involves the following activities:

- **Construction of portfolio** based upon the data base of the investor, his objectives, constraints, preferences for risk and return etc. It consists of portfolio analysis, selection and execution.
- **Monitoring/ reviewing of portfolio** from time to time in light of changing market conditions. Accordingly changes are incorporated in the portfolio.
- **Evaluation of the portfolio** in terms of targets set for risk and return and making adjustments accordingly.

Q: Explain traditional approach to portfolio management.

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Ans:

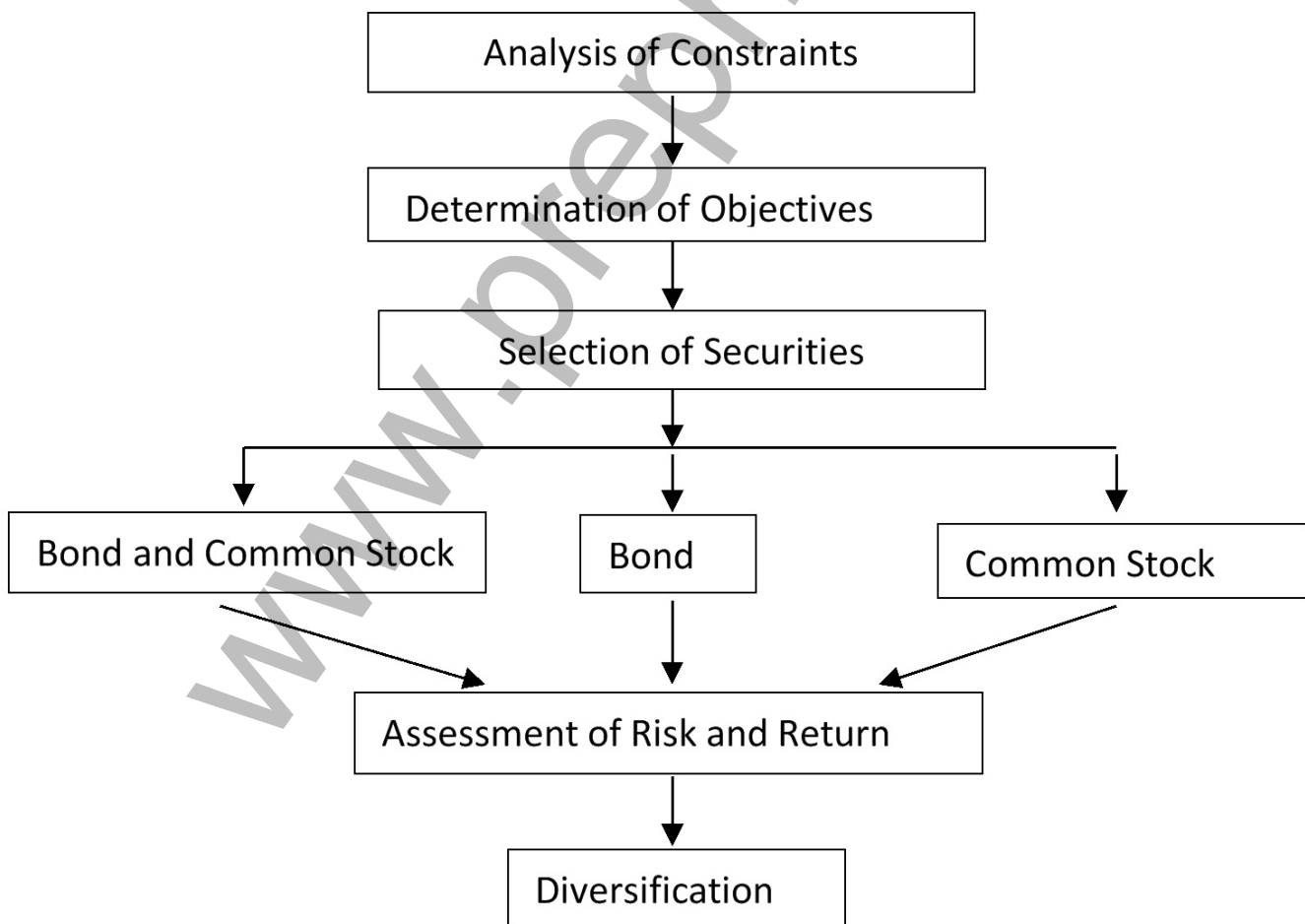
Portfolio management refers to managing an individual's investments in the form of bonds, shares, cash, mutual funds etc. so that he earns the maximum profits within the stipulated time frame.

The traditional approach is a comprehensive financial plan for the individual. It takes into account the individual needs such as housing, life insurance and pension plans. The traditional approach basically deals with two major decisions. They are:

- a) Determining the objectives of the portfolio.
- b) Selection of securities to be included in the portfolio.

Normally, this is carried out in the following steps.

Steps in Traditional Approach



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Analysis of Constraints:

Before formulating the objectives, the constraints of the investor should be analysed. The constraints may be: income needs, liquidity, time horizon, safety, tax considerations and the temperament.

Income needs: The investor should establish the income which the portfolio should generate. The investor should also estimate the impact of inflation on his estimated stream of income and build a portfolio which could offset the effect of inflation.

Liquidity: Liquidity needs of the investment is highly individualistic. If the investor prefers to have high liquidity, then funds should be invested in high quality short-term maturity debt instruments such as money market, funds, commercial papers and shares that are widely traded.

Safety of the principal: Another constraint to be considered by the investor is the safety of the principal amount. Investing in bonds and debentures is safer than investing in the stocks.

Time Horizon: Time horizon is the investment-planning period of the individuals, which varies from individual to individual. This determines the nature of investment.

Tax consideration: Investors in the income tax paying group consider the tax concessions they could get from their investment. They would like to reduce the taxes, and this constraint makes the investor to include the items which will reduce the tax.

Temperament: The temperament of the investor himself poses a constraint on framing his investment objectives. Some investors are risk takers who would like to take up higher risk even for low return. While some investors are risk averse, who may not be willing to undertake higher level of risk even for higher level of return. The risk neutral investors match the return and the risk.

Determination of Objectives:

Within the given frame work of above mentioned constraints, objectives are formulated. The objectives of portfolio range from income to capital appreciation. The common objectives are stated below:

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- 1) Current Income
- 2) Growth in Income
- 3) Capital Appreciation
- 4) Preservation of Capital

The investors in general would like to achieve all the four objectives. But, it is not possible to achieve all the four objectives simultaneously. If the investor aims at capital appreciation, he should include risky securities where there is an equal likelihood of losing the capital.

Selection of Securities:

Based on the objectives, securities are selected. The proportion of investments on debt and equity depends on the various objectives of the investor, as explained below:-

Current Income and asset mix: If objective is to earn adequate amount of current income, then more of debt and less of equity would be a good combination.

Growth of Income and asset mix: Here the investor requires a certain percentage of growth in the income received from his investment. The investor's portfolio may consist of more of equity shares (say 60% or more) and less of debt (say upto 40%) in his portfolio. Appreciation of principal amount is given less priority.

Capital appreciation and asset mix: Capital appreciation means that the value of the original investment increases over the years. Investment in real estates like land and house may provide a faster rate of capital appreciation but they lack liquidity. Next to real assets, the stock markets provide best opportunity for capital appreciation. If the investor's objective is capital appreciation, maximum amount (say 90% or more) of his portfolio may consist of equities.

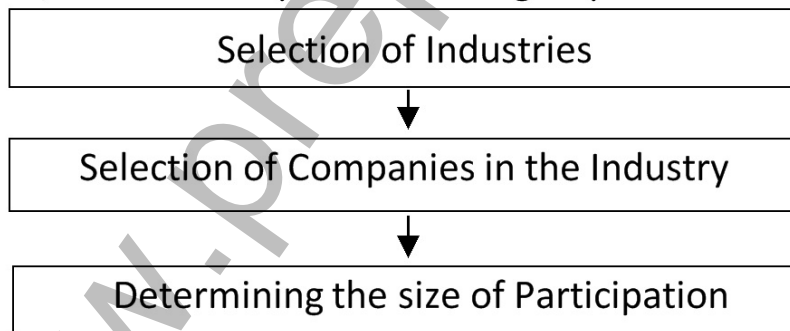
Safety of Principal and asset mix: Usually, the risk averse investors are very particular about the safety of principal. Such investor's portfolio may consist more of debt instruments and less of equity shares to ensure more safety of the principal amount.

Risk and Return Analysis:

The individual prefers larger to smaller returns from securities. To achieve this goal, the investor has to take more risk. The investor analyses the varying degrees of risk and constructs his portfolio. His objective is to maximise the return and minimise the risk. At first, he establishes the minimum income that he must have to avoid hardships under most adverse economic condition and then he decides risk of loss of income that can be tolerated.

Diversification:

Once the asset mix is determined and the risk and return are analysed, the final step is the diversification of portfolio. The unsystematic risks involved in investment can be reduced and returns can be optimised through diversification. According to the investor's need for income and risk tolerance level portfolio is diversified. In the bond portfolio, the investor has to strike a balance between the short term and long term bonds. Short term fixed income securities offer more risk to income and long term fixed income securities offer more risk to principal. In the stock portfolio, he has to adopt the following steps:



The investor has to select the industries appropriate to his investment objectives. Then, the investor has to select companies from each industry. The selection of the company depends upon its growth, yield, expected earnings, past earnings, expected price earning ratio, dividend, etc. The final step in this process is to determine the number of shares of each stock to be purchased. This involves determining the number of different stocks that is required to give adequate diversification. Depending upon the size of the portfolio, amount is allocated to each stock.

Q: Discuss in detail Markowitz theory of Portfolio analysis.

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Ans:

Dr. Harry M. Markowitz developed the first modern portfolio analysis model. He used mathematical programming and statistical analysis in order to arrange for the optimum allocation of assets within portfolio. He developed a mean-variance model for the selection of portfolio. The concept of efficient portfolio has been enunciated in this model. A portfolio is efficient when it yields higher return for a particular level of risk or minimises risk for a specified level of expected return. Markowitz approach determines, for the investors, the efficient set of portfolio through three important variables:

Return, Standard Deviation and Coefficient of Correlation.

The Markowitz model makes the following assumptions regarding investor behaviour:-

- 1) Investors consider each investment alternative as being represented by a probability distribution of expected returns over some holding period.
- 2) Investors maximise one period expected utility.
- 3) Individuals estimate risk on the basis of variability of expected returns.
- 4) Investors base decisions solely on expected return & variance (or standard deviation) of return only.
- 5) At a given risk level, higher returns are preferred to lower returns. Similarly, for a given level of expected returns, investors prefer less risk to more.
- 6) The markets are efficient and absorb all the information quickly and perfectly.
- 7) Investors are risk averse. Before making any investments, all of them, have a common goal- avoidance of risk.
- 8) Investors are rational. They would like to earn the maximum rate of return with a given level of income or money.
- 9) The investors can reduce the risk if he adds investments to his portfolio.

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A portfolio of assets under the above assumptions is considered to be efficient if no other portfolio of assets offers higher expected return with the same (or lower) risk or lower risk with the same (or higher) expected return.

Parameters of Markowitz Diversification

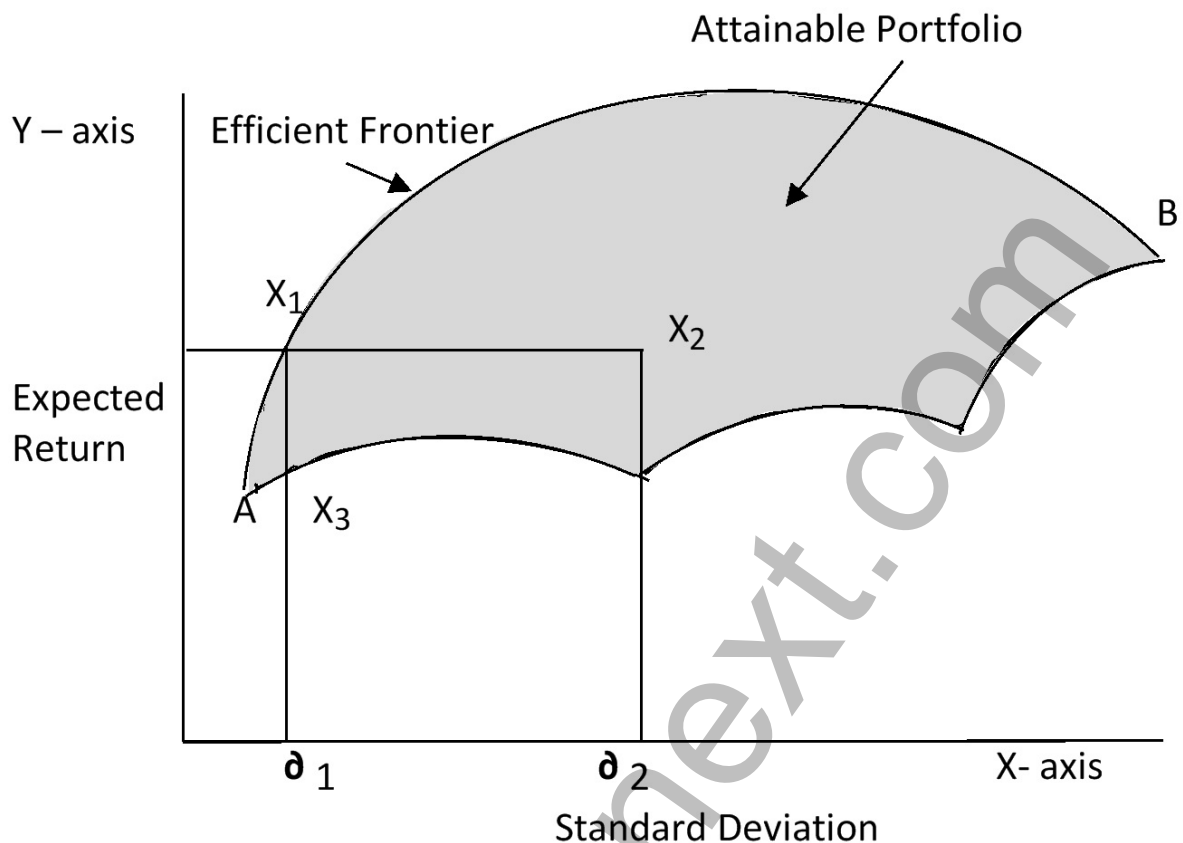
Based on thorough and scientific research, Markowitz has set down his own **guidelines** for diversification:

- i) *The investments have different types of risk characteristics. Some are systematic or market related risks and the others are unsystematic or company related risks.*
- ii) *His diversification involves a proper number of securities, not too less not too many.*
- iii) *The securities have no correlation or negative correlation.*
- iv) *Last is the proper choice of the companies, securities or assets whose returns are not related and whose risks are mutually off-setting to reduce the overall risk.*

Markowitz Efficient Frontier

A graphical representation of the Mean-Variance Criterion is presented in the following figure. The X-axis denotes the standard deviation of the return and the Y-axis denotes the expected return. Given its expected return and standard deviation, any investment option can be represented by a point on such a plane and the set of all potential options can be enclosed by an area such as shown in the figure. In the figure, the shaded area represents the attainable set of portfolio considerations, with their own risks and expected returns. Any point inside the shaded area is not as efficient as a corresponding point on the efficient frontier – the arc AB. For example, Point X_1 offers the same expected returns as point X_2 , but has a smaller standard deviation. Any point below X_1 e.g. X_3 has the same std. deviation but a smaller expected return.

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In the above graph, arc AB is the efficient frontier. All points on this arc provide a superior combination of risk and return to other combinations within the shaded area, which represent attainable portfolios. Each portfolio has its own combination of risk and return. Investor's final choice out of the range depends on his taste.

Limitation of Markowitz Model:-

- i) The Markowitz approach requires several inputs for portfolio analysis. These are expected return of the securities, variance of their return and co-variances. All these inputs are not available easily.
- ii) Calculation, under Markowitz Model, is easy when the number of securities in the portfolio is two or three. As the number of securities in the portfolio increases, which indeed is the case in real life situations, the amount of calculations required to be done becomes enormous.

iii) The problem with the Markowitz model is that it assumes that all the risk and return characteristics can be explained by the covariance of the securities' returns with the returns of other securities. Thus, changes in factors, such as the growth rate of the economy or the inflation rate, are not accounted for directly.

iv) In the real world, portfolio analysts do not keep track of correlations between stocks of diverse industries. As such, correlating a security to a common index is much more convenient than correlating to a large number of individual securities.

Q: Under the Markowitz model, what are the portfolio return and portfolio risk? (www.prepNext.com)

Ans-

Markowitz model – Portfolio Return

The portfolio return can be calculated with the help of the following formula:

$$R_p = \sum_{t=1}^N x_1 R_1$$

R_p = return on the portfolio

x_1 = proportion of total portfolio investment in security 1

R_1 = expected return on security 1

Markowitz model – Portfolio Risk

The portfolio risk can be calculated with the help of the following formula:

$$\sigma_p = \sqrt{X_1^2 \sigma_1^2 + X_2^2 \sigma_2^2 + 2 X_1 X_2 (r_{12} \sigma_1 \sigma_2)}$$

σ_p = Portfolio standard deviation

X_1 = Percentage of total portfolio value in stock X_1

X_2 = Percentage of total portfolio value in stock X_2

σ_1 = Standard deviation of stock X_1

σ_2 = Standard deviation of stock X_2

r_{12} = correlation co-efficient of X_1 and X_2

$$r_{12} = \frac{\text{Covariance of } X_{12}}{\sigma_1 \sigma_2}$$

Portfolio Construction

Portfolio is a combination of securities such as stocks, bonds and money market instruments. The process of blending together the broad asset classes so as to obtain optimum return with minimum risk is called portfolio construction. Keeping a portfolio of single security may lead to a greater likelihood of the actual return somewhat different from that of the expected return. Diversification of investments helps to spread risk over many assets. Hence, it is a common practice to diversify securities in the portfolio.

**Traditional Approach Vs. Modern Approach of
Portfolio Construction:**

Commonly, there are two approaches in the construction of the portfolio of securities viz. traditional approach and Markowitz efficient frontier approach.

- 1.** The traditional approach is a comprehensive financial plan for the individual. It takes into account the individual needs such as housing, life insurance and pension plans. But these types of financial planning approaches are not done in the Markowitz approach.
- 2.** Markowitz gives more attention to the process of selecting the portfolio. His planning can be applied more in the selection of common stocks portfolio than the bond portfolio.
- 3.** In the traditional approach, investor's needs in terms of income and capital appreciation are evaluated and appropriate securities are selected to meet the needs of the investor. In Markowitz approach, the stocks are not selected on the basis of need for income or appreciation. But the selection is based on the risk and return analysis. The investor needs return and it may be either in the form of market return or dividend. They are assumed to be indifferent towards the form of return.
- 4.** In the modern approach, portfolios are constructed to maximise the expected return for a given level of risk. It views portfolio construction in terms of the expected return and the risk associated with obtaining the expected return.

Q: What is Diversification? What are the different methods of diversification? *(www.prepNext.com)*

Ans:

The unsystematic risks or company related risks involved in investment and portfolio management can be reduced and returns can be optimised through diversification i.e. by carefully selecting variety of the assets, instruments, and securities. When different assets are added to the portfolio, the total risk tends to decrease.

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Forms of Diversification

The diversification may take any of the following forms:

- (a) Investment in different **type of assets**, like gold, silver, government securities, real estate, housing etc.
- (b) Investment into **different instruments or securities** like equity shares, bonds, debentures, government securities.
- (c) Investment into **different industry** lines e.g. pharmaceuticals, cement, technology, steel, fertilizers, oil and gas etc.
- (d) Investment into **different companies** e.g. new companies, growing companies, blue chip companies etc.

A few **methods of diversification** are as follows:

1. Random/ Simple/ Naive Diversification: This method involves placing of companies in any order and picking them in a random manner, without any analysis. The probability of selecting wrong companies will come down because of randomness. However, some experts suggest that random diversification does not bring the expected results. Diversification should, therefore, be related to industries which are not related to each other.

2. Optimum Number of Companies: The investor should determine the optimum number of companies in which to invest the money. If the number of companies is too small, risk cannot be reduced adequately and if the number of companies is too large, there will be diseconomies of scale.

3. Adequate Diversification: An investor should decide not only the optimum number of securities but also the right kind of securities. Even if there are a large number of companies, the risk may not be reduced adequately if the companies are positively correlated with each other and the market. In such cases, all of them will move in the same direction and the risks will not decrease.

4. Markowitz Diversification: Markowitz emphasised on the right number of securities as well as on right kind of securities which are negatively correlated or not correlated at all. According to him, the unsystematic risk can be reduced to an optimum level or even can be reduced to zero if diversification is proper. The investor can minimise the total risk by investing in such a diverse set of stocks because they may differ in the degree of risk and may have negative or no covariance. However, diversification cannot reduce systematic risk.

Q: What are the problems of diversification? (www.prepNext.com)

Ans:

Investment in too many assets may lead to the following problems:

1. Selection of Bad Stocks: While buying stocks at random, sometimes, the investor may purchase certain stocks which will not yield the expected return.

2. Difficulty in obtaining information: When there are too many securities in a portfolio, it becomes difficult for the portfolio manager to obtain detailed information about their performance. In the absence of information, he may not be able to make right decision as to what to buy and what not to buy.

3. Increased research cost: Before purchasing different stocks, detailed analysis of the individual companies has to be carried out. This not only requires collecting, processing and storing of information but also involves high costs in terms of salaries to be paid to the analysts.

4. Increased Transaction Cost: Purchase of stocks involves transaction costs. Purchasing stocks in small quantities frequently involves higher transaction costs than the purchase of large quantity in one go.

Q: “Diversification helps in the reduction of unsystematic risk and promotes the optimisation of returns for a given level of risks in portfolio management.” Discuss the effects of combining the securities. *(www.prepNext.com)*

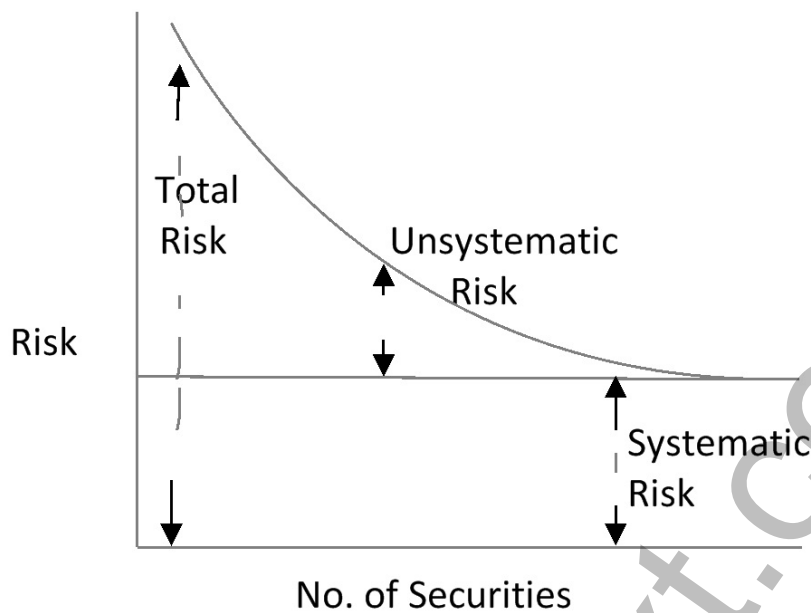
Ans:

Efforts to spread and minimise risk take the form of diversification. The more traditional forms of diversification have concentrated upon holding a number of security types (stock, bonds) across industry lines (utility, mining, manufacturing groups). The reasons are related to inherent differences in bond and equity contracts, coupled with the notion that an investment in firms in dissimilar industries would most likely do better than in firms within the same industry. Holding one stock each from mining, utility, and manufacturing groups is superior to holding three mining stocks.

Effect of Diversification

Diversification helps reducing variability of returns and reducing risk of total investment. The diversification works because returns and prices of all securities do not move exactly together. Variability in one security will be off set by the reverse variability in some other security, hence, the overall risk of the investor will be less and less affected. The total risk arising from a portfolio of an investor can be classified into two components. One is market related risk which can not be diversified at all which is called non-diversifiable or systematic risk, and another component which can be eliminated through diversification is called diversifiable or unsystematic risk. A portfolio manager seeks to eliminate unsystematic risk by proper diversification though he can not eliminate systematic risk.

The effect of diversification on the risk of portfolio is represented graphically as under:



Relationship Between Risk and Diversification

Effects of Combining Securities:

Expected return from individual securities carries some degree of risk. Diversification of one's holdings is intended to reduce risk. Holding two securities is less risky than holding either security alone. It is also possible to reduce the risk of a portfolio by incorporating into it a security whose risk is greater than that of any of the investments held initially. For example, given two stocks, A and B, with B considerably more risky than A, a portfolio composed of some of A and some of B may be less risky than a portfolio composed exclusively of the less risky asset, A.

Example: Assume the following about stocks A and B:

	Stock A	Stock B
Return (%)	7 or 11	13 or 5
Probability	.5 each return	.5 each return

Suppose that when A's return is high, B's return is low, and vice versa. In other words, when the return on A is 11 percent, the return on B is 5 percent; similarly, when the return on A is 7 percent, the return on B is 13 percent.

Now, Using the figures of the example of stocks A and B:

Possible Outcome	Probability P	Stock A			
		Range of Return (R) (i)	Expected Return E(R) (ii)	Deviation R-E(R) (iii)	$[R-E(R)]^2 \times P$ (iv)
1	0.5	7	9	-2	2
2	0.5	11	9	2	2
				Variance =	4

Possible Outcome	Probability P	Stock B				$(iii) \times (vii) \times P$
		Range of Return (R) (v)	Expected Return E(R) (vi)	Deviation R-E(R) (vii)	$[R-E(R)]^2 \times P$ (viii)	
1	0.5	13	9	4	8	-4
2	0.5	5	9	-4	8	-4
				Variance =	16	-8 (Co-Variance)

	Stock A	Stock B
Expected Return (%):	9*	9**
Variance (%):	4	16
Standard deviation (%):	2	4

* Expected return = $(.5) (7) + (.5) (11) = 9$

** Expected return = $(.5) (13) + (.5) (5) = 9$

Clearly, A and B have the same expected return, 9 percent, B is riskier than A (standard deviation of 4 versus 2).

Let us now construct a portfolio consisting of two-thirds stock A and one-third stock B. The average return of this portfolio is:

$$R_p = \sum_{i=1}^N X_i R_i$$

where, R_p = expected return to portfolio

X_i = proportion of total portfolio invested in security i

R_i = expected return to security i

N = total number of securities in portfolio

Therefore, $R_p = (2/3) (9) + (1/3) (9) = 9$

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Expected return can be calculated for both the possibilities as follows:

Possibility 1 (when A is better as an investment)

$$= \frac{2}{3} * 11 + \frac{1}{3} * 5 = 9$$

Possibility 2 (when B is better as an investment)

$$= \frac{2}{3} * 7 + \frac{1}{3} * 13 = 9$$

The above illustration shows that holding a combination of 2/3 of A and 1/3 of B, the expected return will always be equal to 9. In both the situations, the investor will gain even if the worst occurs. Thus, the investor can reduce the portfolio risk by holding two securities in a portfolio. The risk of the portfolio is reduced by playing off one set of variations against another. Finding two securities each of which tends to perform well whenever the other does poorly makes more certain a reasonable return for the portfolio as a whole, even if one of its components happens to be quite risky. However, it is important to know what proportion of the stock should be bought by the investor in order to minimise the risk. Moreover, the investors will have to find out securities which are related to each other inversely like the example given for stocks A and B. When two stocks are taken on a portfolio and if they have negative correlation, the risk can be completely reduced, because the gain on one can offset the loss on the other.

Effect of Holding More Than One Security on Portfolio Risk:

Holding two securities in the portfolio can reduce the portfolio risk also. According to Markowitz, the securities with covariance which is either negative or low amongst themselves, is the best manner to reduce risk. According to him, investing in a large number of securities is not the right method of investment. It is the right kind of securities which brings the maximum results. The following formula has been given by Harry Markowitz.

$$\sigma_p = \sqrt{X_1^2 \sigma_1^2 + X_2^2 \sigma_2^2 + 2 X_1 X_2 (r_{12} \sigma_1 \sigma_2)}$$

Where, σ_p = Portfolio Standard Deviation
 X_1 = Percentage of total portfolio in Stock A
 X_2 = Percentage of total portfolio in Stock B
 σ_1 = Standard deviation of stock A
 σ_2 = Standard deviation of stock B
 r_{12} = Coefficient of correlation between Stock A and Stock B

In the above example, the covariance between Stock A and Stock B is negative i.e. -8.

Coefficient of Correlation (r_{12}) = $COV_{AB} / \sigma_A \sigma_B$

By putting the values, we get:

$$r_{12} = -8 / (2 \times 4) = -1$$

$$\sigma_p = \sqrt{[(2/3)^2 \times 2^2 + (1/3)^2 \times 4^2 + 2 \times (2/3) \times (1/3) \times (-1 \times 2 \times 4)]} = 0$$

It indicates that if securities are perfectly negatively correlated, portfolio risk is zero. In brief, the standard deviation of the portfolio is affected by the proportion of funds allocated to each stock, standard deviation of each stock and covariance between two stocks.

The portfolio effect of two securities can also be applied to three or more securities to find out the effect on the portfolio.

Expected return from individual securities carries some degree of risk. The simple fact that securities carry differing degrees of expected risk leads most investors to the notion of holding more than one security at a time, in an attempt to spread risks by not putting all their eggs into one basket. Diversification of one's holdings is intended to reduce risk in an economy in which every asset's returns are subject to some degree of uncertainty.