CENTRE FOR DISTANCE AND
ONLINE EDUCATION
PUNJABI UNIVERSITY PATIALA

Class : BBA-Part-III Semester : V

Paper : BBA-512 UNIT: II

(INVESTMENT MANAGEMENT)

Medium : English

Lesson No. UPDATED ON 10TH JUNE, 2023

2.1 : Technical Analysis
2.2 : Portfolio Management
2.3 : Concept of Portfolio and Sharpe Model-I
2.4 : Portfolio Theory and Sharpe Model-II
2.5 : Capital Asset Pricing Model : Tests and Applications

2.6 : Portfolio Selection and Revision

BBA PART-III PAPER : BBA-512
SEMESTER-V INVESTMENT MANAGEMENT

LESSON NO. 2.1 AUTHOR : DR. PATWANT KAUR

TECHNICAL ANALYSIS

2.1.0 Objectives

Technical Analysis has an important bearing on the study of price behaviour and has its own method in predicting price behaviour. This chapter presents the opinions of the technical school of thought. Their means and the methods in which they predict prices and their opposing views to fundamental analysis.

2.1.1 Basic Tenets of Technical Analysis

Technical analysis of the market is based on some basic tenets, namely, that all fundamental factors are discounted by the market and are reflected in prices. Secondly, these prices move in trends or waves which can be both upward or downward depending on the sentiment, psychology and emotions of operators or traders. Thirdly, the present trends are influenced by the past trends, and the projection of future trends is possible by an analysis of past price trends. Analysis of historical trends confirmed the above principles and the Random Walk Theory explaining the randomness of price change has been found to be not applicable by the technical analysis in practice.

2.1.2 Tools of Technical Analysis

2.1.2.1 Daily Fluctuation or Volatility :

Open, high, low and close are quoted. Changes between open and close or high and low can be taken in absolute points or in percentages to reflect the daily volatility. Such fluctuations can be worked out on weekly, monthly or yearly basis also the reflect the general volatili ty in any scrip. But a stable up trend or downtrend can be discerned from these changes for the investor to interpret the market.

A Bar chart as given below can be used to depict the daily variations : High

	High	High
Close	Open	Open
	Close	Close
Low/Open	Low	Low

An yearly High - Low indicated the possible levels with in a range that the price may move which helps to locate entry and exit points.

2.1.2.2 Floating Stock and Volume of Trade :

Floating Stock is the total number of Shares available for trading with the public and volume of trade is any part of that floating stock. The higher this proportion, the higher is the liquidity of a share which is to be purchased or sold. Volume trends are also a supporting indicator to the price trends to interpret the market.

2.1.2.3 Price Trends and volume Trends :

The Chartist Method and Moving Average Method can be used to depict these trends. The price trends are shown with the help of charts depicting varions movements over a period of time. In the same way Moving Average Method computes the average of prices over a period of time.

2.1.2.2.1 Rate of Change of Prices and volumes or the ROC Method :

This is useful like the moving average method to indicate more clearly the buy and Sell signals. The Chartist method is useful to indicate the directions and the trend reversals. ROC is calculated by dividing the today's price by the price five days back or few days back. It can be expressed as percentage or positive or negative change. Thus, they can be moving around 100, in the case of percentages or zero lines in the case of positive and negative percentage changes.

2.1.2.5 Japanese Candlestick Method

There are three main types of candlesticks with each day's trade being shown in the form of candlesticks. Each stick has the body of the candle and a shadow. The body shows the open and close prices while the shadow shows the high and low prices. The three main types are as follows :

(a) Closing price is higher than the open price (White Candlestick)

(b) Closing price is lower than the open price (Black Candlestick)

(c) Open and close are at the same level (Doji Candle stick)

This method will indicate any likely changes in trends in the short run.

2.1.2.6 Dow Theory :

There are three major trends in this theory. Minor, intermediate and major trends representing daily or weekly, monthly and yearly trends in prices respectively comparing the price trends to waves, tides and ripples.

2.1.2.7 Elliot Wave Theory :

The market is unfolded by a basic rhythm or pattern or 5 waves up to be corrected by three waves down with a total of 8 waves a philosophy of price trends.

2.1.2.8 Theory of Gaps

Gaps in price between any two days causing discontinuity is called a gap. The high of one day may be lower than the low of the previous day when prices are failing. Gaps indicate the likely acceleration of the trend of reversal. Gaps are of different categories that are common gaps, Break out gaps, Run away gaps, Exhaustion gaps.

2.1.2.9 Advance Decline Line or Spread of the Market :

The ratio between advances to declines will indicates the relative strength of upward or downward phases. When the advances are increasing over declines it is an upward phase and the reverse indicates the downward phase.

2.1.2.10 Relative Strength Index (RSI) of Wells Wilder :

It is an oscillator used to identify the inherent strength or weakness of particular scrip.

Thus, RSI = $100 - \left[\frac{100}{1 + RS}\right]$

Where, RS = $\frac{\textit{Average Gain Per Day}}{\textit{Average Loss Per Day}}$

R.S.I is calculated for one scrip while RSC or the relative strength comparative, is the ratio of the prices of two different scrips, used for comparison of two or more scrips. RSI can be calculated for any number of days, say 5 of 10 etc. to indicate the strength of price trend.

2.1.3 Dow Theory

The Dow Theory postulates that prices of industrial securities tend to move in tune with business cycles of the boom, depression etc. In the economy. As the corporated performance depends on the industrial growth

and the tone of the economy, prices of shares should broadly reflect the overall trend in the economy, which in developed countries are dependent on the business cycles and business expectations. If the business conditions are good, demand increases, industrial performance will be good and the corporate Share prices will be on the upswing. The reverse is the true in times of recession and depression in the economy. The trends in the economy are reflected in the market average prices of shares. All fundamental factors are thus discounted by the market, and get reflected in average prices. It will thus be seen that factors affecting these supply and demand conditions in the market are summed up in the average prices in the market. A study of these average market prices is what is attempted in technical analysis and its trends are in the form of peaks, trough and cycles.

2.1.2.1 Major Trends :

The trends in stock prices are divided under three heads - primary, secondary and minor. The primary trend is a long term trend of a year or more reflecting the basic mood of the market showing upward or downward movement. The secondary or intermediate trend represents the correction to the primary trend and is of a short duration of a few weeks to a few months. The minor trend may be in either direction on a daily or weekly basis, but pointing to the underlying primary trend either upward or downward. These three trends are comparable to the tides, waves and ripples of the sea respectively. If the successive waves move further in land towards the beach than the preceding ones then the tide would reflect the upward trend through higher peaks and trough. On the reverse side, if the tide is moving inwards in to the sea, then the trend is downward and prices trend to decline on average. Each successive minor trend and intermediate trend result in a net downward movement and support the primary market trend in the downward direction.

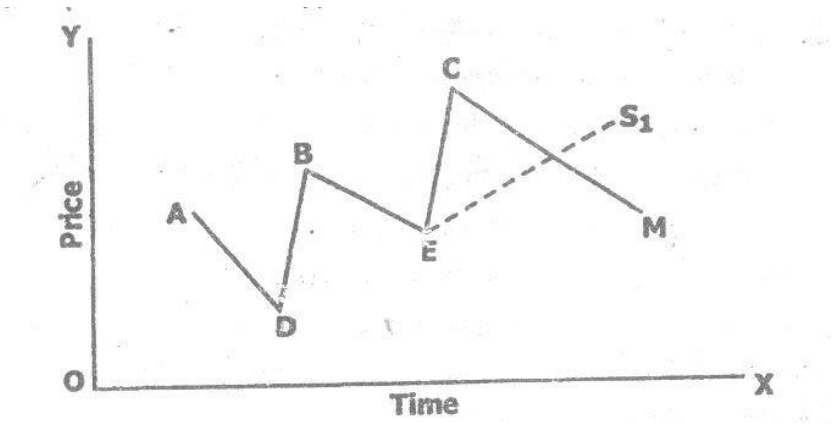
In the Dow Theory, The major trends, namely bullish or bearish trends, have three phases, In the first phase of bullsih trend, called the accumulation phase, only a select elite of investors who perceive the coming things first start buying shares. In the second phase, the followers of trend notice a discrete up trend and begin to participate in the buying and then the mass buying starts. The third phase is the end of the uptrend when the first elite group who initiated the first phase should dislodge their shares for profit taking. Then there will be a reversal of the trend. The fall in the prices in a bull phase is a technical reaction and a rise in prices in a bear phase is a technical rally. The concentration in the hands

of bull is called accumulating, which when sold off gets distributed and there will be decline in prices.

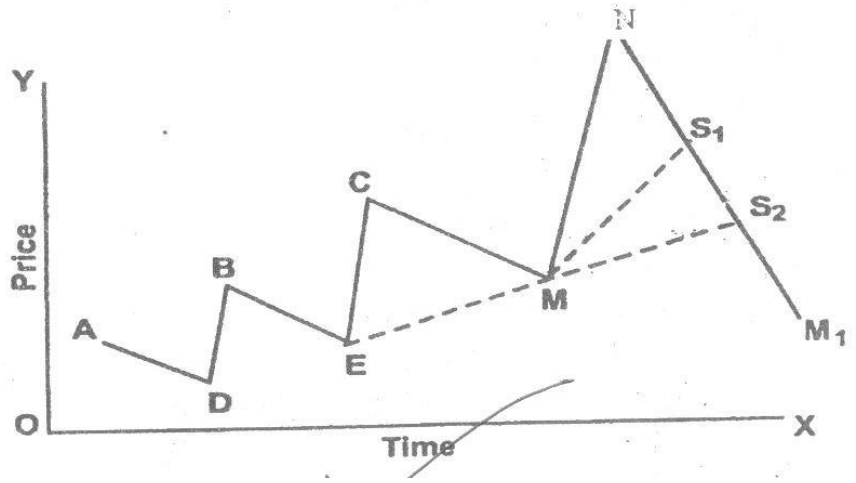
So far as the volume of trade is concerned it should expand in the direction of the major trend. During the uptrend period, the volume would expand when prices rise and decrease when prices decline. During the down trend, there will be reversal of the trend and the volume will expand when prices drop and contract when they start rising.

The only problem which is grey area in the Dow Theory is the signal for reversal of the trend. The first symptom of a change would call for 'buy or sell' decision and those who perceive the change fast would gain in speculation. As the primary trend continues, the gain from speculation decreases. The fact of the matter is that it is not easy, to detect a change in the direction in the existing trend and the first leg of the new trend in the opposite direction. For knowing the reversal point a lot of experience and expertise is necessary in this line.

The reversal pattern in explained below A,B, C are the successive peaks during the upswing, but M is a point of trough which is lower than the earlier troughs of D and E. The point S, is the point of sell signal. This is called the failure swing diagram C.



In the non-failure swing diagram M is below E but the peak is still above peak B. So, it is not certain whether the point S_1 to S_2 should be the same signal. Whether the point of reversal has set in or not is clear from the diagram. Such occasions arise in both upswing and downswing diagrams.



2.1.5 Chartist Method

As referred to earlier, technical analysis is a study of the market data in terms of factors affecting supply and demand schedules, namely prices, volume of trading etc. A study of the historical trends of market behaviour shows the cycles and trends in prices which may repeat as the present in a reflection of the past and the future of the present. This is the basis for forecasting the future trends which are used for deciding on the basis of the buyer sell signals. For forecasting, analysts use charts and diagrams to depict the past trends and project the future. But these methods are rough, and there are no fool proof methods of forecasting the stock prices. The technical analysis only helps to improve the knowledge of the probabilities of price behaviour (upswing or downswing) and help the investment process. The technical analysis does not claim 100% chance of success in predictions that are made for investment.

In view of the limitations inherent in the technical analysis, this analysis is generally juxtaposed with fundamental analysis of the market and the scrips. It was the past experience that the receipt of information and the actual price absorption of the information would not coincide and there is a time lag between them. As a result the current price changes would give a clue to the subsequent price changes, if properly analysed and interpreted.

In the market analysis, the variables to be taken into account are the breadth of the market, volume of trading etc. market breadth is the dispersion of the general price rise or decline, which means daily acumulation of a net number of advancing or declining issues, breadth analysis focuses on change rather than level in prices. Breadth of price

changes in terms of number of gainers or losers among the scrips is analysed to know the width of rise or fall in prices.

2.1.6 Breadth of the Market

The breadth of the market analysis is base on the nature of stock market cycles. Bull markets are viewed as long drawn-out affairs, during which individual stocks reach peaks gradually with the number of individual peaks accelerating as the market averages rise to the turning point. Thus the turning point for a bull phase is at that point where a large number of stocks are failling when the averages are still rising. In the bear market, there is a large number of stocks failling in a period of time. The end of the bear market is near when there is a selling climax and a large number of sellers rush to sell all at once. The breadth is measured by the number of scrips rising or falling to the total number. In a bull phase there will be a large number of net rises and in a bear phase, a large number of net falls.

Normally, the breadth and the market average lines move in tandem. In a bull phase, if the breadth line declines to successive new lows, while the market average is going up, it means that large number of scrips are declining although blue chips included in the BSE Index continue to rise, but the suggestion is that there is an approaching peak in averages and a major down trend is in the offing later.

2.1.7 Volume of Trading

The above trend of market is to be examined along with the supporting data on volume of trading. Price trends follow the volume trends in general. Historical data analysis of price and volume movements indicate that in a normal market, the price rise is accompanied by an expanding volume. If the level of the volume is declining more than in the previous rally in times of bull trend it warns of a potential trend reversal. Termination of a bearish phase often accompanied by a selling climax, following a decline in prices, a heavy volume of trade with title price change is indicative of accumulation and is normally a bullish factor. A strong bull market can exist only as long as buying pressure continues to be strong. These indications are to be studied carefully before a final decision is taken on the state of the market, whether bullish or bearish, to phase of the uptrend or down trend and look for buy and sell signals at the start of the reversal trends.

2.1.8 Tripod of Technical Analysis :

I. Market prices are determined by a host of fundamental, technical, and other factors, which are both rational and

irrational. It is possible that the market prices may be over valued or under valued always.

II. Average market price discounts all developments and is a reflection of the sum total of all forces operating on the market.

III. History or past trends have a role in the shaping of the future and as such as at analysis of the past helps the projection for the future.

2.1.9 Principles of Technical Analysis :

The principles involve in technical analysis and in particular in Dow Theory analysis can be summarized as follows :

I. Principle of wave motion and trends leads to differences of price trends.

II. Action and reaction resulting from buying and selling pressures lead to corrections and rallies to major up trends and down trends respectively.

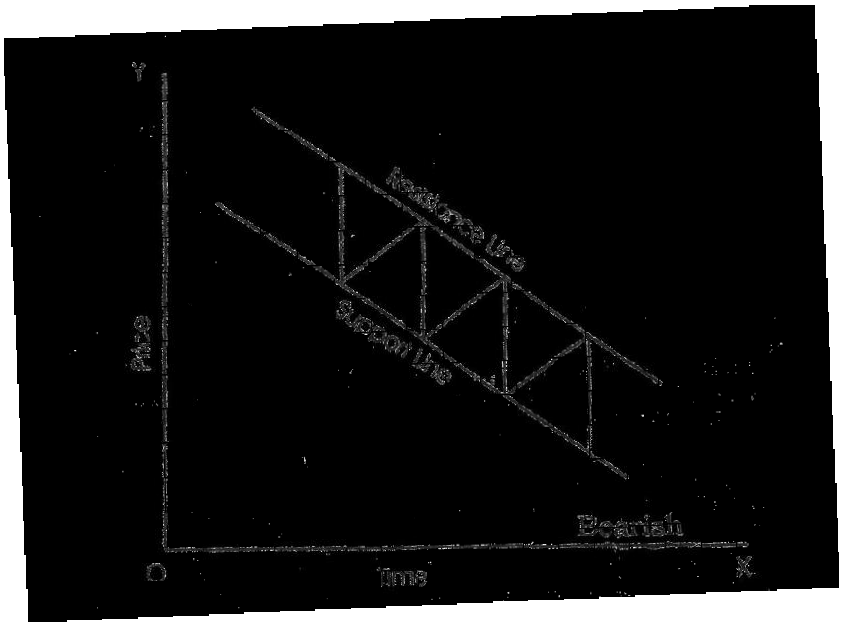
III. Principle of congestion involving support and resistance lines results in a phase of activity, in which the market is undecided, hesitant and the trend undetermined. The prices move with in a band of resistance and support lines and the trends involve up and down movements in a more or less horizontal path, until the prices are driven up or down.

In congestion, the continuous pressures of buyers are met equally. But when the buyers exceed the seller both in volume and value of deals, then the price emerges from the bottom of the range and there will be an up- breakout. When the seller predominates, there will be a down breakout in the price level the resistance and support lines are broken in either case. When buyers are increasing their purchase mid the volume increases then there is said to be accumulation. When sellers are increasing their sales and the volume rises, than there is said to be distribution. When buying exceeds selling and persists, then there is a breakout of prices from the congestion in to a bull phase. On the other hand, when selling exceeds buying and continues to persist, the congestion is broken out into a bear phase.

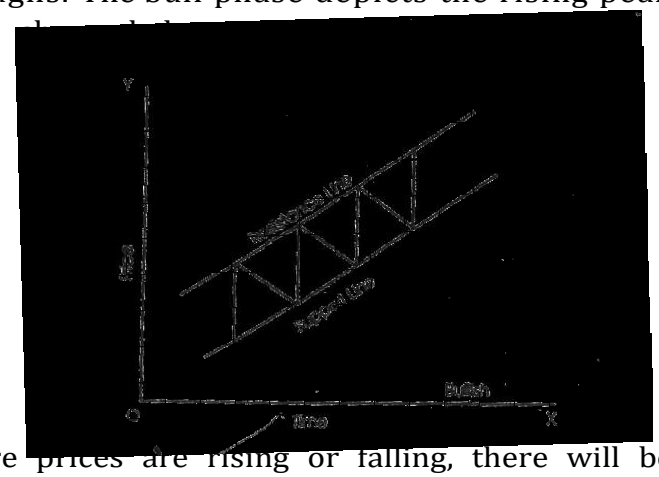
2.1.10 Charts and Trend Lines :

The use of charts for analysis of prices is technical analysis was referred to Fitting a trend line for price changes on the daily basis is the first step in the analysis of charts. These changes may be pointing upwards or downwards or stable over a horizontal one. The movements are such that there are both

peaks and troughs these price changes, peaks showing an upward trend through or reactions to the uptrend viz. line-joining the lowest points or troughs pointing up. If this line is pointing downwards, then it is a bearish phase, as shown below :



If the movements are downwards generally, then there will be rallies moving up the prices. These upper peaks, if they are joined, give the trend line as much as the lowest troughs. The bull phase depicts the rising peaks successively as



When the share prices are rising or falling, there will be resistance level above which the prices may not move in the upward direction or a support level, below which the price may not fall.

These support times and resistance times are clearly noticed when the prices are moving in a narrow band for sometime. When the price pierces the resistance line, this is the first indication of the reversal of the trend in the upward direction. So also in a bull phase when the price line falls below the support line, a reversal of the trend is indicated.

2.1.11 Moving Averages :

The analysis of the moving averages of the prices of scrips is another method in technical analysis. Generally, 7 days, 9 days and 15 days moving averages are worked out in respect of scrips studied and depicted on a graph along with similar moving averages of the market index like BSE sensitive index. There will then be two graphs to be compared and when the trends are similar the scrip and BSE market index will show comparable average risks.

The theory of moving averages also lays down the following guidelines for identifying the buy and sell signals. Whenever the moving average price line cuts the actual price line of the scrip or of the market index form the bottom, it is a signal from above, it is the right time to buy shares. Here the comparison can be made separately for the BSE market index moving average with its actual price index and the moving average price of any scrip with its actual price.

2.1.12 Advantages of Moving Averages :

Since the rice fluctuations are wide and frequent, reflecting the volatility of the market and the scrips, some amount of smoothing can achieved by taking the moving averages of the prices. Generally, the closing prices of these scrips are taken for the moving averages. The usefulness of this will also depend on the number of days 7 days, 10 days, 20 days etc. For which these averages are worked out. These averages can be represented in a graphical from to help identification is that then the actual scrip price crosses the short term moving average line. This is to be supported by other evidence of a reversal of the trend to justify the buy signal. The short term moving average of 7 or 10 days should cross the longer term moving averages to finally confirm the buy signal. In other words, the buy signal is to be given when the moving average line cuts the actual price line from above. If it cuts from below, then the signal is to sell. This signal of moving averages can also be confirmed by further analysis of other technical factors like the trend reversal shown in the chart graphs referred to above.

2.1.13 Charts :

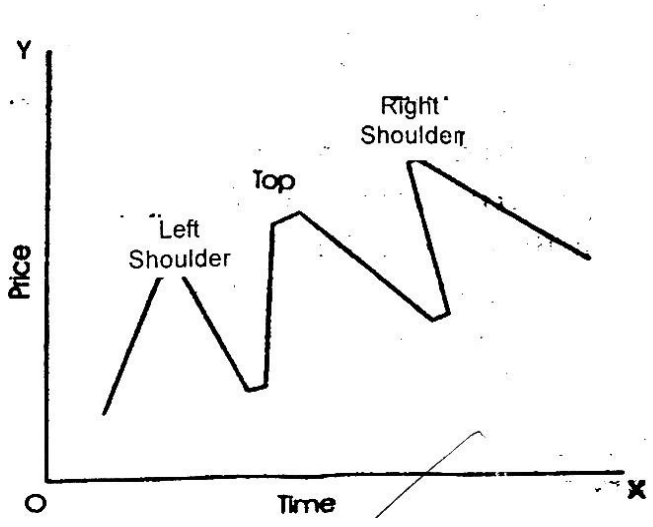
The drawings of charts, a graph etc. is a method by which the technical analysis is made. These charts depict the trends in prices rate of changes in prices, volume of trading etc.

There are various types of charts, namely point charts, vertical bar charts etc. All these would depict the trends in prices and breadth of trading which are both indicators of buying and selling pressures and the market behaviour.

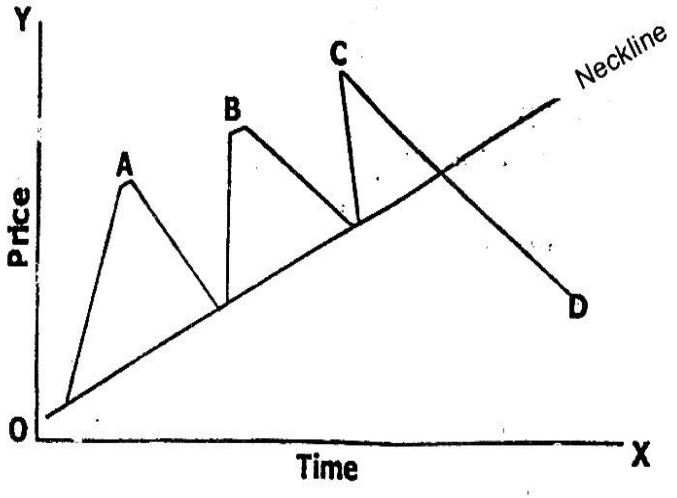
2.1.13.1 Head and Shoulders :

The configurations emerging from the charts show different patterns of these the most important is the 'Head and Shoulders'. It depicts a top and reversal pattern in the either the bull phase or the bear phase.

Head and shoulder is formed when the prices reach the top under a strong buying impulse and trading volume becomes less than it did during the upswing to each the top. Then there is another high volume advance, which takes the price to higher top than in the case of the left shoulder. This is called the 'Head' top and followed by another reaction on less volume which takes prices down to a bottom near to early recession. The third rally which takes the prices up reaches a height of less than that of the head and results on the right shoulder, which has a comparable height as the left shoulder. This type of configuration occurs under a bull phase and the exact configuration occurs in a bear phase. This is indicative of a likely reversal of the trend. This is very effective in indicating the upward or downward trend in the prices of a scrip.



2.1.13.2 Breaking the Neckline



If the prices are having an up trend movement in a full phase and the configuration of the head and shoulders is noticed, then the analyst has to look for a possible trend reversal indicator. This can be noticed when the third recession cuts the support line down across the bottoms of the two reactions between the left shoulder head and right shoulder (Called "the neckline") and the actual price line should go below the neckline by about 3 to 5 points of the market price as shown in graph.

There are a number of other patterns which are to be looked into by analysts, if they are doing an in-depth analysis. These patterns are useful to identify the primary or secondary trends. Some signs of reversal can be seen in the rounding tums and triangles and gaps. However, some gaps are attributed to ex-dividend, ex-bonus etc. or due to symptoms of consolidation and acceleration or exhaustion and reassessment or it may be breakaway gap of the market. Some insight in to the future movement of prices can be had by a close study of pattern that prices are making. Thus, forecasting is a practical use to which the charts in general and this configuration in particular can be put to.

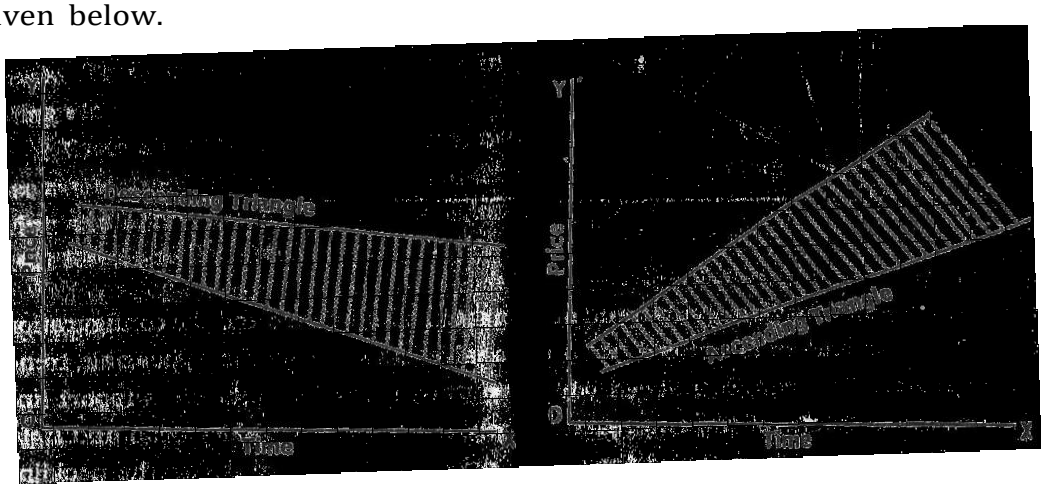
The bull market indicators are as follows. the bear market has been in progress for a long time. The peaks of advancing points are still slopping upwards. The number of advancing points is substantially higher than the number of

declining points. If the stock establishes certain levels of accumulation and consolidation over a number of days or weeks and if the volume of trading slows down, then it is certain the distribution is taking place and it will meet with the resistance level soon. So as a rule, it is safe to buy at the top or three points below or around the old bottom.

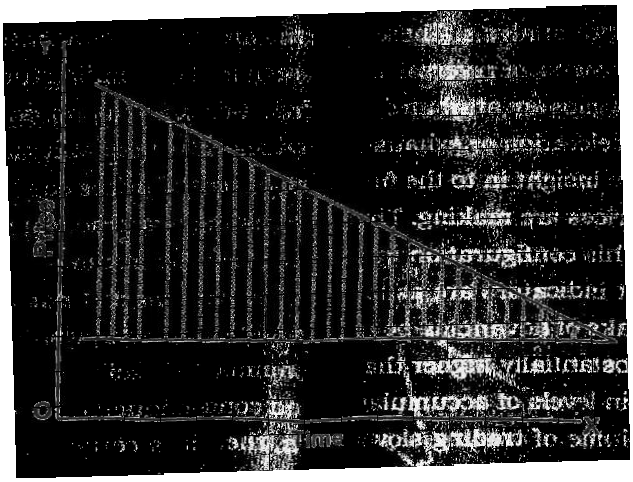
The bear market indications may be set out as follows. A bull market has been in progress for a long time. The recovery is occurring on low volume and the number of advancing points is only slightly higher than the number of declining points. The line connecting the peaks of declining point is slopping upwards but the price line may cross the support level soon due to exhaustion on the market pressure. It is better to sell at the previous high to peak or 3 points around the high.

2.1.13.3 Resistance and Support Lines

The point and figure charts should clearly indicate the bull or bear phases. But some configurations do not clearly indicate the definite signals such as in the case of a symmetrical triangle. While the ascending triangle and descending triangle indicate the upward and downward phases respectively as given below.



The symmetrical triangle drawn below does not clearly indicate anything.



Consolidation refers to time interval in which the price of a share does not break through in either direction. Then the price movements are in a narrow band with both the resistance and support lines moving horizontally.

2.1.12.1 Speculative Trading and Technical Analysis :

Timing of purchase and sale is very important particularly for speculative trading. The basis rule is to follow the daily chart of highs, lows or tops/ bottoms. when the long term is bullish and price trend is pointed up, the advance line must make higher tops and higher bottoms. One can enter the market any time so long as the up trend is continuing as indicated by the higher tops and bottoms. the best buy point is when the prices decline by 50% of the higher ever peak achieved or at a level of 50% between the extreme low and extreme high. The best points to sell or when the prices rise to the old top levels or near to those levels or when the prices start advancing after being below the 50% point between the extreme high and extreme low. There is no sancity of these levels. As they are set by experience and observation. Experience and analysis are the best guides in the these matters.

Before taking the buy and sell decisions, one has to observe the rules of the game :

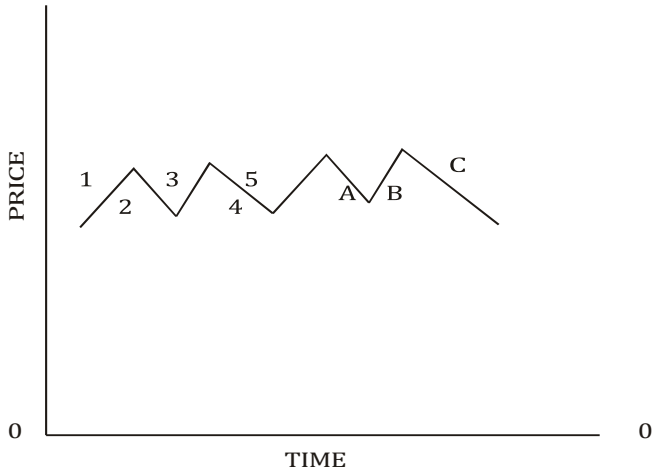
- Put stop loss under at, say, 10% of one's capital at any time. This will protest the extent of losses possible in speculation.
- Draw the daily, weekly, monthly charts separately and observe the highs and low and the mid-points and turning points

carefully.

- The buy and sell signals can be located at 3 points below the highs or 3 points above the lows etc.

2.1.15 Elliot Wave Theory :

There is a number of theories which seek to explain the behaviour of the market. In the are of the technical analysis, one such theory is that of Ralph Elliot. According to this theory, the market is unfolded through the basic rhythm of pattern of 5 waves up and 3 waves down from a complete cycle of 8 waves. This wave principle is derived from empirically tested rules from the studies on stock market price trends. The basic patterns of waves is reflected in various cycles and waves. On complete cycle consists of wave made up of two distinct phases bullish and bearish. Thus, the wave 1 is upward and wave 2 corrects the wave 1. Similarly, waves 3 and 5 are those with an upward impulse but are corrected by waves 2.1 and 6 respectively. An entire sequence of 1 to 5 waves a corrected by the sequence of bearish waves, namely A, B, C. Thus, in a complete cycle, there are five bullish phases and 3 bearish phases, as shown in below figure. The impulse



waves are the waves in the direction of the main trend and the corrective waves are less in number but reverse the earlier trend. This is based on the principle that action is followed by reaction. Once the full cycle of waves is completed after the termination of 8 waves moment, there will be a fresh cycle starting with similar impulses arising out of market trading, change of sentiment in the market etc. again the will be 5 cycles upward

constituting the bullish trend and 5 waves downward, consisting the bearish trend. According to the followers of Elliot wages theory, accuracy and time liners of the waves is the basis for their usefulness in identifying the buy and sale signals in the market. A lot of empirical work has gone into the study of the waves and cycles of prices. It has been found that the behaviour of prices on the stock markets confirms to the cycles and waves it is possible to use these data for predicting the price change and deciding on the buy and sell signals.

2.1.16 Operation or Wave Theory :

The wave is a movement of the market price from one change in the direction to the next change in the direction. The waves are result of buying and selling impulses emerging from the demand and supply pressures on the market. If the demand exceeds supply, there is pressure of over bought position leading to a rise in prices. If the supply exceeds demand, there is oversold position in the market leading to a downward trend in the prices. Depending on the pressure of the over bought positions the waves are generated in the prices.

The stock market has been found to behave in a consistent manner giving rise to a basic rhythm and a wave movement in prices. The basic rhythm is reflected in 3 impulses in one direction followed by 2 waves of corrective nature with a total of 5 in the wave phase and 3 cycles in reverse phase. These 3 waves correct the entire movements of 5 major upward movements.

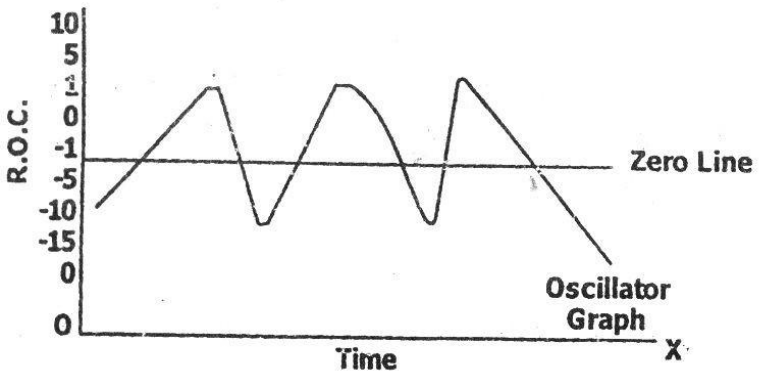
The personality of each wave is an integral part of the reflection of mass psychology that it embodies. Although sometimes these wave counts are not clear, the shape and length may very depending on the buying and selling pressures. But the analysis who have the experience and expertise can discern the waves in both upward and downward directions and also the impulse waves and corrective waves. These will help the analyst to learn what the charts tell regarding the phase and turning point. The wave principle offers the tools of identifying the market turns and their approach. As a limitation, however, it should be noted that the wave theory is not perfect and there are many limitations in its practical use. The rhythm as will as the count number of the waves may not be consistent and it may be possible to dearly discern the turning point and take proper decision on buy and sell. Self check exercise No. 1 write a short note on breaking the Neckline graph.

2.1.17 Oscillators (Rate of Change or ROC

Oscillators refer to the velocity of price changes reflecting the market

momentum, which is measured by the rate of change of prices. This rate of change may be over the short period of 5 to 10 days or longer period of 3 to 6 months. These oscillators may also be based upon the daily market prices when the volatility of the market spread is measured on a daily basis. Most oscillators would move in the same direction, either positive or negative depending on the trends on the market. A positive reading reflects on overbought market and negative reading reflects oversold market. These oscillators in the form velocity of price changes are plotted around a zero line to reflect both positive and negative values of the graph. The shape of the oscillator will depend on the period for which it is calculated say 5, 10 or 20 days. If the oscillator is for a longer period, it will become a smother curve and if it is complied on a daily basis. It will be widely fluctuating.

Usefulness of the oscillator, graph depends on a proper reading of the graph. As a general rule, if the oscillator, reaches the extreme lower end, it is suggested to buy and if it is at upper end then the suggestion is to sell. The crossing of the zero line may also be understood as the first indication of buy and sell signals.



The crossing of the zero line is an important indicator of the price trends and its direction. The market is said to be overbought when the oscillator is at the upper extreme and is oversold when the oscillator is in the lower extreme. These points provide the signals of buy and sell to the investor. Generally, the peaks and troughs in the actual price chart also reflect the peaks and troughs of the oscillator graph. A study of oscillators is thus useful to confirm the conclusions arrived by the basic trend analysis and the use of charts.

2.1.18 Summary

This chapter analyses the behaviour of stock prices through the technical analyst's view point. According to them, the fundamental analysts look for intrinsic prices of the share just like the technical analysts do but the fundamental analysts have a tedious method of finding out the stock prices. The technical analysts believe that their method simple and give an investor a bird's eye on the future of security price by measuring the past moves of price. The technical analysts predicted price behaviour through line chart, bar chats and pot and figure charts. They have a large number of patterns which predict the upward and downward swings in the market. There are large number of theories which also predict the future prices like the theories of contrary opinion which encompasses the opinion of old lot theory and short sales. The measures which are used by the technical analysis to predict and analyses the prices are confidence index, the breadth of market, the relative strength, the trading volume and moving average analysis.

2.1.19 Self check exercise

1. Explain Dow theory
2. What are oscillators
3. Explain Elliot Wave Theory

2.1.20 Exercise Questions

1. How is technical analysis different from fundamental analysis in Investment Management.
2. What are charts? How are they interpreted in technical analysis?

Short Questions

Explain :

- Dow Theory (ii) Moving Average Analysis
- Wave Theory
- What are various tools of technical analysis

2.1.21 Suggested Readings

- Investments : Amling
- Management of Investment : Jack Clark Francis
- Investment Mgt. : V.K. Bhalla

PORTFOLIO MANAGEMENT

2.2.1 Objective:

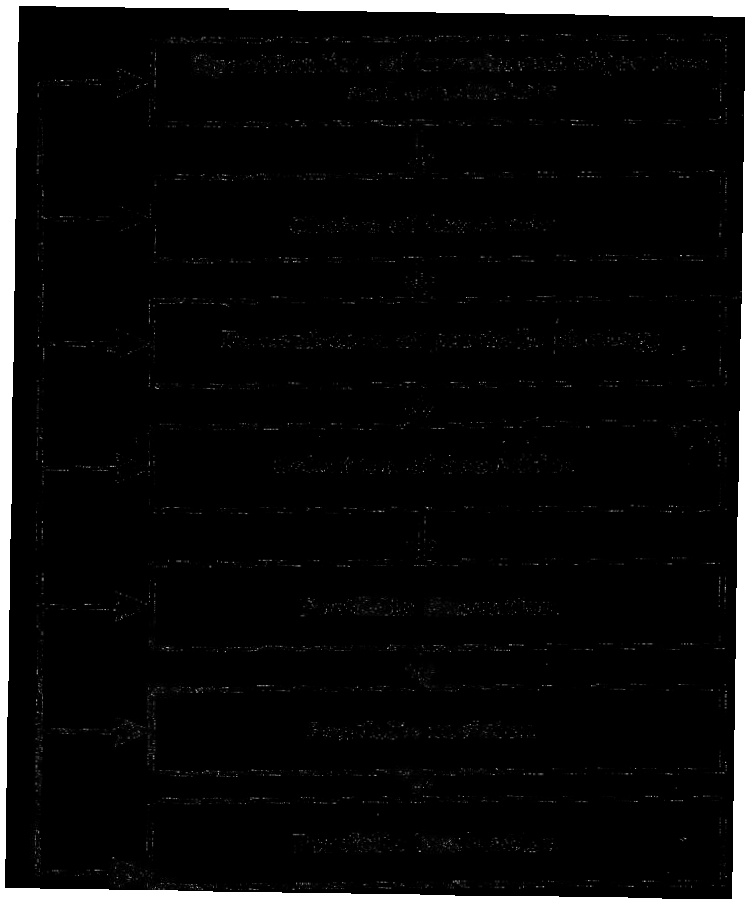
The objective of the chapter is to study the management of Portfolios. A detailed analysis of formulating portfolio strategy and its performance measure is discussed in the chapter.

2.2.2 Introduction

Investment management, also referred to as portfolio management, is a complex process or activity that may be divided into seven broad phases :

I. Specification of investment objectives and constraints.
II. Choice of asset mix
III. Formulation of portfolio strategy.
IV. Selection of securities.
V. Portfolio Rebalancing or Revision
VI. Performance evaluation.

For pedagogic convenience these phases are treated sequentially. However, it must be emphasized that they are interrelated as shown in Exhibit given below:



2.2.3 Specification of investment objectives and constraints.

The first step in the portfolio management process is to specify one's investment objectives and constraints. The commonly stated investment goals are:

(a) Income ■ To provide a steady stream of income through regular interest/ dividend payment.

(b) Growth ■ To increase the value of the investment amount through capital appreciation and rowth in current income.

(c) Stability ■ To protect the principal amount invested from the risk of loss.

Since income and growth represent two ways by which return is generated and stability implies containment or even elimination of risk, investment objectives may be expressed more succinctly in terms of return and risk. As an investor, you would primarily be interested in a higher return (in the form of income and/ or capital appreciation) and a lower level of risk. However, return and risk typically go hand-in-hand. So you have to ordinarily bear a higher level of risk in order to earn a higher return. How much risk you would be willing to bear to seek a higher return, depends on your risk disposition. Your investment objective should state your preference for return relative to your distaste for risk.

2.2.4 Risk Return Trade Off ■

Your risk-return trade off can be expressed in the form of an indifference curves (or utility curves) as given below :

Diagram A

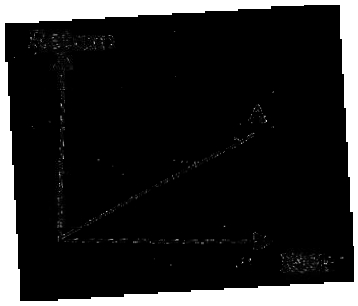


Diagram B

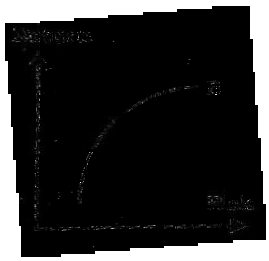


Diagram C

These indifference curves show three broad types of utility curves. The linear indifference curve, depicted in diagram a, represents the risk-return tradeoff of on investor who is willing to bear additional risk if there is a equal proportional increase in return. The concave indifference curve,

shown in diagram B, describes the preferences of a Risk-lover. He is willing to assume disproportionately higher amounts of risk for earning additional returns. Finally, the convex indifference curve, shown in diagram C, reflects the preferences of an investor who requires disproportionately higher returns for bearing additional risk. An investor generally have a diminishing marginal utility for wealth, their risk-return tradeoff is represented by a convex utility curve.

2.2..4 Operational Statement of Investment Objectives

Theoretically, you are expected to maximise your utility level, which is a function of risk and return. So you are supposed to :

(a) specify your utility indifference curves; and

(b) strive to achieve the highest attainable utility level.

In practice, however, there are problems in developing utility indifference curves. Given this practical difficulty, you would do well to specify your investment objectives in one of the following ways.

1. Maximise the expected rate of return, subject to the risk exposure being held within a certain limit (the risk tolerance level).
2. Minimise the risk exposure, without sacrificing a certain expected rate of return (the target rate of return). Which of these two should your adopt?

We should start by defining how much risk you can bear or how much you can afford to lose, rather than specifying how much money you want to make. The risk you can bear depends on two key factors (a) your financial situation; and (b) your temperament. To assess your financial situation answer the following questions : What is the position of year wealth? What major expenses (house construction, marrige, education, medical treatment, etc.) can be anticipated in the near future? What is your earning capacity? How much money can you lose without seriously hurting your standard of living? A careful and realistic appraisal of your assets, expenses, and earnings is basic to defining your risk tolerance.

After appraising your financial situation, assess your temperamental tolerance for risk. Even though your financial situation may permit you to absorb losses easily, you may become extremely upset over small losses. On the other hand, despite a not-so-strong financial position, you may not be easily ruffled by losses. Understand your financial temperament as objectively as you can.

Your risk tolerance level is set by either your financial sitution on your

fiancial temperament whichever is lower. Of course, you must realise that your risk tolerance cannot be or should not be defined too precisely and rigorously. For practical purposes, it suffices if you define it as low, medium or high. Once you have articulated your risk tolerance realistically in this fashion, it will serve as a valuable guide in your investment selection. It will provide you with a useful perspective and prevent you form being a victim of the waves and manias that tend to sweep the market from time to time.

Constraints →

In pursuing your investment objective, which is specified in terms of return requirement and risk tolerance, you should bear in mind constraints arising out of or relating to the following factors :

Liquidity →

What are your liquidity needs in the foreseeable future that need to be reflected in designing your portfolio?

Taxes→

Given your tax situation, what kinds of tax shelter, if any, should you seek?

Time horizon →

What time horizon is appropriate for your portfolio? 1 year, 5year, 10 years, or any other?

Unique preferences and circumstances →

Are there some unique preferences and circumstances which should have a bearing on your portfolio decisions?

2.2.5 Selection of Asset Mix

In your scheme of investments, you must accord top priority to a residential house and a suitable insurance cover. In addition, you must maintain a comfortable liquid balance in a convenient form to meet expected and unexpected expenses in the short run. Once these are adequately provided for, your asset mix decision is concerned mainly with financial assets which may be divided into two broad categories, viz. stocks and bonds.

Stocks →

It includes equity shares (which in turn may be classifiwed into income shares, growth shares, bluechip shares, cyclical shares, speculative shares, and so on and units/ shares of equity-oriented schemes of mutual funds (like Master shares, Birla Advantage, and so on. 'Bonds', defined

very broadly, consist of non-convertible debentures of private sector companies, public sector bonds, gilt-edged securities, RBI relief Bonds, units/ shares of debt-oriented schemes of mutual funds, National Saving Certificate, Indira Vikas Patras, Bank Deposits, Post Office savings deposits, fixed deposits with companies, deposits in provident fund and public provident fund schemes, deposits in the National Savings Scheme, and so on. The basic characteristic of these investment in that they earn a fixed or near fixed return.

Should the long-term stock-bond mix be 50:50 tp 75:25 or 25 : 75 or any other?

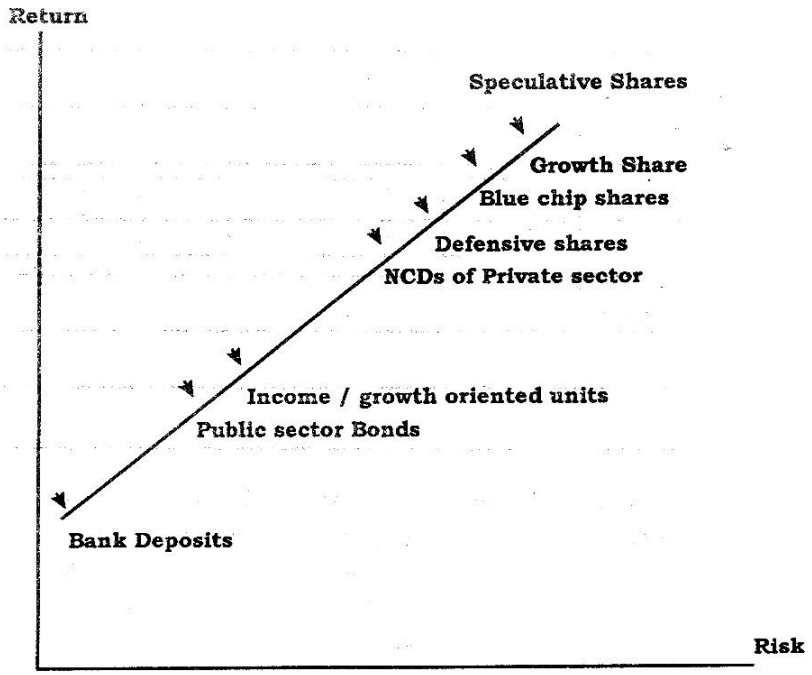
Referred to as the strategic asset-mix decision (or policy asset- mix decision) this is by for the most important decision made by the investor. Emperical studies have shown that nearly 90% of the variance of the portfolio return is explained by its asset mix. Put differently, only about 10% of the variance of th e portflio return is explained by other elements like ' sector' rotation and security selection'. Given the significance of the asset-mix decision, you should hammer it out carefully.

Conventional Wisdom on Asset Mix →

The conventional wisdom on the asset mix is embodied in two propositions:

1. Other things being equal, an investor with greater tolerance for risk should tilt, the portfolio in favour of stocks, whereas an investor with lesser tolerance for risk should tilt the portfolio in favour of bonds. This is because in general stocks are riskier than bonds hence earn higher returns than bonds following exhibit portrays the risk-return relationship for various types of stock and bonds investments.

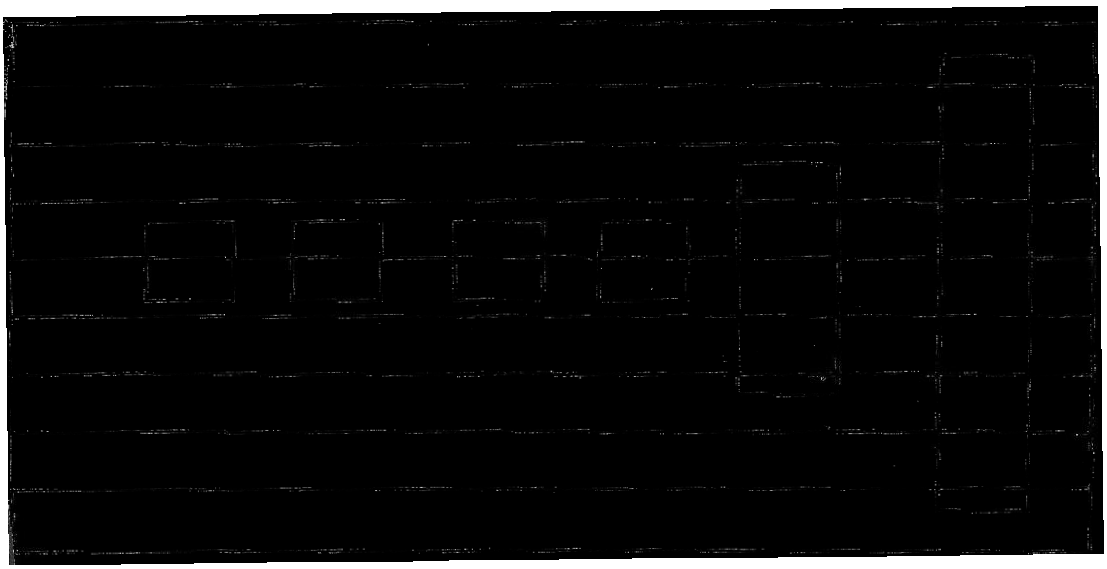
Risk return relationship for various types of Bonds and Stocks



James H. Lorie summed up the long view well when he stated". The most enduring relation in all finance perhaps is the relationship between returns on equities (or stocks) and returns on bonds. In all periods of American History British history, French history and German history, equities (stocks) have provided higher returns than bonds." A similar observation can be made when we look at the returns on stocks and bonds in India for the last time two decades.

2. Other things being equal, an investor with a longer investmet horizontal should tilt his portfolio in favour of stocks whereas an investor with a shorter investments horizon should tilt his portfolio in favour of bonds. This is because while the expected return from stocks is not very sensitive to the length of the investment period, the risk from stocks diminishes as the investment period lengthens. This proposition is illustrated in following exhibit. Which shows the average return and range of return from stocks for various investment period over the period 1950- 1980 in the U.S capital market.

Range of Returns on Common Stocks for Various Time Period, 1950-1980



	1-year Periods	5-year Periods	10-year Periods	15-year Periods	20-year Periods	25-year Periods
High	+52.6%	+23.9%	+19.3%	+16.47%	+13.4%	+10.3%
Average	+13.0%	+10.4%	+9.5%	+9.3%	+9.4%	+9.4%
Low	26.6%	2.4%	+1.2%	+4.3%	+6.5%	+8.4%

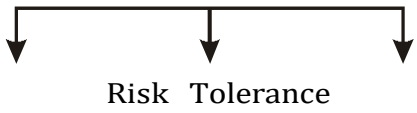
Source : Vanguard Group

One can reasonably expect a similar pattern in other capital markets as well. Why does the risk of stocks diminish as the investment period longthens? As the investment period longthens, the average yearly return over the priod is subject to lesser volatility because low returns in some years may be offset by high returns in other year and vice versa. Put differently there is the benefit of time diversification' whcih is distinct from 'portfolio diversification'. As Mark Kritzman say : "Since investors cannot know which period is the best period, they invest through many periods Hence they are more comfortable investing in risky assets over the long run than over the short run."

The implications of the above proposition are captured in following Exhibit which shows how the appropriate percentage allocation to the stock component of the portfolio is influenced by the two basic factors

viz. risk tolerance and investment horizon (A popular rule of thumb for asset allocation says that the percentage allocation to debt must be equal to the age of the individual).

Appropriate percentage Allocation to the Stock Component of the Portfoliod →



Time Horizon	Low	Moderate	High
Short	0	25	50
Medium	25	50	75
Long	50	75	100

To obtain the corresponding percentage allocation for the bond component of the portfolio, simply substract the number given inthe exhibit from 100. You will find this matrix helpful in resolving your asset mix decision. (Of course, before using this matrix, you would define your risk tolerance and investment horizon as realistically as possible). In applying this matrix, the zero percent given for the low risk tolerance/ short time horizon, may be raised to 10 percent or so. In a similar manner, the 100 percent, given for the cell high risk tolerance/ long time horizon, may be lowered to 90 percent. These modifications will help the investor in realising the benefit of diversification across stocks and bonds.

For the sake of simplicity, we assumed that there is a single investment horizon. In reality, an investor may have multile investment horizons corresponding to varied needs. For example, the investment horizons corresponding to various goals sought by an investor may be as follows :

Investment Goal	Investment Horizon
Buying a car	Two years
Constructing a house	Ten Years
Achieving financial independence	Twenty Years
Establishing a charitable institution	Thirty Years

The Fallacy of Time Diversification →

Paul Samuelson and others have argued that the notion of time diversification is fallacious. Even though the uncertainty about the average rate of return diminishes over a long time period, it also compounds over a

longer time perod. Unfortunately the latter effect dominates. hence the total return becomes more uncertain as the investment horizon lengthens.

An example will illustrate this print. Suppose the expected one year return on a stock is 15 percent wth a standard deviation of 30%. If you hold the stock for 5 years, the expected annual return over 5 years remains at 15%, but the standard deviation of the average return over 5 years declines from 30% to 13.42% (30√5). Even though the standard deviation of the 5 years return is now significantly lower at 0.1342 (or 13.42 %), a disappointment of one standard deviation will affect the terminal wealth by a factor of (1-0.1342) 5=0.487. This certainly has a larger impact than a swing of 30% in one year. As Bodie et all. Put it: "While the confidence band around the expected rate of return narrows with investment life, the dollar confidence band widens."

The above result has an important implication although an investor is less likely to lose money over a longer horizon as compared to a shorter horizon, the magnitude of his potential loss clearly increases with the length of his investment horizon. Hence the critics of time diversification argue that if you prefer a risk less investment over a shorter investment horizon, you should prefer a riskless investment for over a longer investment horizon as well. Put differently, your risk exposure should not depend on your investment horizon.

Resurrection of Time Diversification →

Although the above critique of time diversification is mathematically correct, all is not lost for those who believe in the principle of time diversification. There remain some valid reasons why you should still condition your risk posture on your investment horizon. Two of them deserve a particular mention.

1. There is some evidence that stock returns are not serially independent but tend to mean-revert over long intervals. This means that it is more likely that a below average return may be followed by an above average return than another below average return. Given this tendency of stock returns to mean-revert, the dispersion of terminal wealth increases at a slower return than what is implied by serially independent returns. (Remember that the critics of time diversification assume a perfectly efficient market in which stock returns are serially independent).

2. You may be inclined to accept more risk over a longer horizon as you have greater scope to adjust your consumption and work habits. As Mark Kritzman put it, "If a risky investment performs poorly at the beginning of

a short horizon, there is little you can do to compensate for loss of wealth. Over a long horizon, however, yu can postpone consumption, and work harders to achieve your financial goals."

2.2.6 Formulation of Portfolio Strategy →

After you have chosen a certain asset mix, you have to formulate an appropriate portfolio strategy. Two broad choices are available in this respect, an active portfolio strategy or a passive portfolio strategy.

Active Portfolio Strategy →

This involves departing from the normal (or strategy or long run) asset mix to reflect one's assessment of the prospects of various assets in the near future. Suppose your investible resources for financial assets are 100 and your nromal (or strategic) stock bond mix is 50:50. In the short and intermediate run however you may be inclined to deviate from your long term asset mix. If you expect stocks to out proform bonds, on a risk adjusted basis, in the near future, you may perhaps step up the stock component of your portfolio to say 60 to 70 percent. Such an action, of course, would raise the beta of your portfolio. On the other hand, if you expect bonds to out perform stocks, on a risk-adjusted basis in the near future, you may step up the bond component of your portfolio to 60% or 70%. This will naturally lower the beta of your portfolio.

Market timing is based on an explicit or implicit forecast of general market movements. The advocates of market timing employ a variety of tools like business cycle analysis, moving average analysis, advance-decline analysis, and econometric models. The forecast of the gneral market movement derived with the help of one or more of these tools is tempered by the subjective judgement of the investors. Often, of course, the investor may go largely by his market sense.

Anyone who reviews the fluctuations in the market may be tempted to play the game of market timing yet very few seem to succeed in this game. A careful study on market timing argues that an investment manager must forecast the market correctly 75% of the time just to break-even, after taking into account the costs of errors and the costs of transactions. As Fischer Black said : "The market does just as well, on average, when the investor is out of the market as it does when he is in. So he loses money relative to a simple buy and hold strategy, by being out of the market part of the time". Echoing a similar view John Bogle, Chairman of the Vanguard Group of investment companeis said: "In 30 years in this business, I don not know anyone who has done it successfully and consistently, nor anybody

who knows anybody who has done it successfuly and consistently. Indeed, my impression is that trying to do market timing is likely to be counter productive." John Maynard Keynes rendered a similar verdict decades ago." We have no proved able to take much advantage of a general systematic movement out of and into ordinary shares as a whole at difeerent phases of the trade cycle. As a result of these experiences. I am clear that the idea of wholesale shifts is for various reasons impracticable and indeed undesirable."

Sector Rotation →

The concept of sector rotation can be applied to stocks as well as bonds. It is, however, used more commonly with respect to the stock component of the portfolio where it essentially involves shifting the weightings for various industrial sectors based ontheir assessed outlook. For example, if you believe that comment and pharmaceutial sectors would do well compared to other sectors in the forth coming period (one year, two year, or whatever), you may over weight these sectors, relative to their position in the market portfolio. Put differently, your stock portfolio will be tilted more towrds these sectors in comparison to the market portfolio.

With respect to the bonds, sector rotation implies a shift in the composition of the bond portfolio in terms of quality (as reflected in credit rating), coupon rate, term to maturity, and so on. For example, if you anticipate a rise in interest rates you may shift from long term bonds to medium term or even short-term bonds. Remember that long term bond is more sensitive to interest rate variation compared to a short term bond.

2.2.7 Security Selection →

Perhaps the most commonly used vector by those who follows an active portfolio strategy, security selection involves a search for under priced securities. If you resort to active stock selection, you may employ fundamental and/ or techncial analysis to identify stocks which seem to promise superior returns and concentrate the stock component of your portfolio on them. Put differently, in your portfolio such sticks will be over weighted relative to their position in the market portfolio. Likewise, stocks which are perceived to be un attractive will be under weighted relative to their position in the market portfolio.

As for as bonds are concerned, security selection calls for choosing bonds which ofter the highest yield to maturity at a given level of risk.

Use of a Specialized Investment Concept →

A fourth possible approach to achieve superior returns is to emply a specialised concept or philosophy, particularly with respect to investment in stocks. As CharlesD. Ellis put it, a possible way to enhance returns" is to develop a profound and valid insight into the forces that drive a particular sector of the market or a particular group of companies or industries and systematically exploit that investment insight or concept." (Charles D. Elis, Investment Policy : How to win Loser's Game, Dow Jones-Irwin Homewood, Illinios, P. 15.) Some of the concepts that have been exploited successfuly by investment practioners are :

Growth stocks

Neglected or 'out of favour' stocks

Asset-rich stocks

Technology stocks

Cyclical stocks

The advantage of cultivating a specialized investment concept or philosophy is that it wll help you to :

(a) focus your efforts on a certain kind of investment that reflect your abilities and talents, (b) avoid the distractions or pursuing other alternatives, and (c) master an approach or style through sustained practice and continual self critique.

As against these merits, the great disadvantage of focusing exclusively on a specialised concept or philosophy is that it may become obsolete. The changes in market place may cast a shadow over the validity of the basic promise underlying the investment philosophy. Given you profound conviction and long term commitment to your specialised investment concept or philosophy, you may not detect the need for change till it becomes rather late.

Passive Strategy →

The active strategy is based on the premise that the capital market is characterised by inefficiencies which can be exploited by resorting to market timing or sector rotation or security selection or use a specialised concept or some combination of these vectors. The passive strategy on the other hand, rests onthe tenet that the capital market is faily efficient with respect to the available information. Hence, the search for superior returns through an active strategy is considered futile.

Operationally, how is the passive, strategy implemented ? Basically, it

involves adhering to the following two guidelines.

(a) Create a well diversified portfolio at a pre determined level of risk.

(b) Hold the portfolio relatively unchanged over time, unless it becomes inadequately diversified or incosnsitent with the investor's risk return preferences.

Portfolio Strategy Matrix →

Keith Ambachsteer has developed a matric shown in following exhibit, which pulls together the elements of timing and selectively. It can be a useful guide for developing your portfolio strategy. (Keith Ambachsteer." Portfolio theory and the Security Analyst.", Financial Analysis Journal, Nov-Dec 1972,P. 33)

Portfolio strategy Matrix

Ability to Select Undervalued securities / Ability to forecast Overall market	Good	Poor
Good	1. concentrate holding in selected indervalued securities rather than diversify broadly. 2. Shift beta above and below the desired long term average based on market forecasts.	1. Concentrate holding in selected indervalued securities rather tahtn diversify broadly. 2. Keep beta stable at the desired long term average
Poor	1. Hold a broadly divers- list of securities. 2. Shift beta above and below desired long term average, based on market forecasts.	1. Hold a broadly diversified ified list of securities. 2. Keep beta stable at desired long term average.

Selection of Securities.

Selection of Bonds (Fixed Income Avenues)

You should carefully evaluate the following factors in selecting fixed income avenues.

1. Yield to maturity : The yield to maturity for a fixed income avenue represents the rate of return earned by the investor if he invests in the fixed income avenue and holds it till its maturity.

2. Risk of default : To assess the risk of default on a bond, you may book at the credit rating of the bond. If no credit rating is available, examine relevant financial ratios (like debt-to-equity ratio, lines interest ration, and earning power) of the firm and assess the general prospects of the industry to which the firm belongs.

3. Tax Shield : In yesteryears, several fixed income avenues offered tax shield; now very few do so,

4. Liquidity : If the fixed income avenue can be converted wholly or substantially into cash at a fairly short notice, it possesses liquidity of a higher order.

Selection of Stock (Equity Shares)

Three broad approaches are employed for the selection of equity shares; technical analysis, fundamental analysis and random selection. Technical analysis looks at price behaviour and volume data to determine whether the stock will move up or down or remain trend less. Fundamental analysis focuses on fundamental factors like the earning level, growth prospects, and risk exposure to establish the intrinsic valueof a share. The recommendation to buy, hold or sell is baed ona comparison of the intrinsic value and the prevailing market price. The random selection approach is based on the premise that the market is efficient and securities are properly priced.

Following exhibit shows the three approaches perform at different levels of market efficiency.

Levels of Market Efficiency and Approaches to Security Selection

Level of efficiency\Approaches	Technical analysis	Fundamental analysis	Random Selection
Inefficiency	Best	Poor	Poor
Weak-form efficiency	Poor	Best	Poor
Semi-strong-form efficiency	Poor	Good	Fair
Strong from efficiency	Poor	Fair	Best

2.2.8 Portfolio Revision

Irrespective of how well you have constructed your portfolio, it soon tends to become inefficient and, hence needs to be monitored and revised periodically. As Robert D. Arnott says; "Portfolios donot manage themselves. Now can weather the ages unaltered. With each passing day, portfolios that we carefully crafted yesterday become very less than optimal change is the investors only constant.

Over time several things are likely to happen. The asset allocation in the portfolio may have drifted away from its target, the risk and return characteristics of various securities may have altered, finally, the objectives and preferences of the investor may have changed.

Given the dynamic developments in the capital market and changes in your circumstances, you have to periodically monitor and revise your portfolio. This usually entails two things viz. portfolio rebalancing and portfolio upgrading.

2.2.9 Portfolio Rebalancing

It involves reviewing and revising the portfolio composition (i.e. the stock bond mix). There are three basic policies with respect to portfolio rebalancing : buy and hold policy, constant mix policy, portfolio insurance policy.

Under the buy the hold policy, the initial portfolio is left undisturbed. It is essentially a 'buy and hold' policy. Irrespective of what happens to relative values, no rebalancing is done. For example, if the initial portfolio has a stock bond mix of 50:50 and after six months the stock bond mix happens to be, say 70:30 because the stock component has appreciated and the bond component has stagnated, the portfolio mix is allowed to drift. Put differently, no changes are effected.

The constant mix policy calls for maintaining the proportions of stocks and bonds in line with their target value. For examples, if the desired mix of stocks and bonds is say 50:50, the constant mix policy calls for rebalancing the portfolio when relative values of its components change, so that the target proportions are maintained.

The portfolio insurance policy cells for increasing the exposure to stocks when the portfolio appreciates in value and decreasing the exposure to stocks when the portfolio depreciates in value. The basic idea is the ensure that the portfolio value does not fall below a floor level.

2.2.10 Portfolio Upgrading

Portfolio upgrading calls for re-assessing the risk-return characteristics of various securities (stocks as well as bonds), selling over priced securities and buying under priced securities. It may also entail other changes the investor

may consider necessary the enhance the performance of the portfolio. You may hesitate to revise your portflio or be too slow in doing so. You may not like to incur the costs of trading like commission cost, taxes, and adverse market impacts. These costs often look very obvious. However, remember that there are costs of non trading which, though subtle, may be significant. Your portfolio may drift into an asset mix that may no longer be appropriate to your needs; you may old over-priced investments, offering inferior, returns; you may forego opportunities of making promising investments. You should learn how to weigh the opportunity cost of non-trading against the explicit costs of trading. In essence, portfolio revision calls for developing an apropriate response to the tension between the 'apparent' cost of trading and the 'subtle' cost of inaction.

2.2.11 Performance Evaluation

The key dimensions of portfolio performance evaluation are rate of return and risk. This section looks at the measures of rate of return risk and performance.

2.2.12 Rate of Return

The rate of return from a portfolio for a given period (which may be defined as a period of one year) is measured as follows :

$$\frac{Dividend\ \ Income \blacksquare Terminal\ Value \blacksquare Initial\ Value}{Initial\ Value}$$

To illustrate the calculation of the rate of return, let us look at the following data:

Initial market value of the portfolio Rs. 1,00,000 Dividend and interest income received toward the end of the year Rs. 10,000 Terminal market value of the portfolio Rs. 1,05,000.

The rate of return on this portfolio is simply :

$$\frac{10{,}000 + 1{,}05{,}000 - 1{,}00{,}000}{1{,}00{,}000} = 0.15\ or\ 15\ percent$$

To calculate the average rate of return, over a period of several years, the following measures may be employed :

(a) arithmetic average of annual rates of return (b) internal rate of return (also referrred to as the money-weighted rate of return) and (c) geometric average of annual rates of return (also referred to as the time weight rate of return). The calculation of these measures may be illustrated with the help of the data given in following exhibit.

Rate of Return Data

Year	Market Value of Portfolio(rs)	Dividend & intt. income	Rate of Return
0	1,00,000		
1	1,05,000	10,000	$\frac{10,000 + (1,05,000 - 1,00,000)}{1,00,000} = 15$ *percent*
2	95,000	10,000	$\frac{10,000 + (95,000 - 1,05,000)}{1,05,000} = 0\%$
3	1,20,000	10,000	$\frac{10,000 + (1,20,000 - 95,000)}{95,000} = 36.8\%$
4	1,40,000	12,000	$\frac{12,000 + (1,40,000 - 1,20,000)}{1,20,000} = 26.7\%$
5	1,50,000	12,000	$\frac{12,000 + (1,50,000 - 1,40,000)}{1,40,000} = 15.7\%$

The arthimetic average of annual rates of return in the above case is :

$$\frac{(15 + 0 + 36.8 + 26.7 + 15.7)}{5}\% = 18.8\%$$

The internal rate of return is defined as the discount rate which brings about an equality between the initial investment and the present value of future benefits associated with the investment. The internal rate of return in the above case is the value of or (which works out to 17.65) in the following equation :

$$1,00,000 = \frac{10,000}{(1+r)} + \frac{10,000}{(1+r)^2} + \frac{10,000}{(1+r)^3} + \frac{12,000}{(1+r)^4} + \frac{12,000 + 1,50,000}{(1+r)^5}$$

The geometric mean of annual rates of return is the nth root of the product of annual wealth ratios (wealth ratio is simply 1+annual rate of return) minus

1. the geometric mean of annual ratesof return in the abvoe case is.

[(1+0.15) (1+0) (1+0.368) (1+0.267) (1+0.157)] 1/5 -1

= about 0.182 pr 18.2%

How useful or appropriate are the above measures of rate of returns 7 let us examine them one by one. The arithmetic average is annual rates of return is appealing because it is simple in concept and application. However, it suffers

from a serious limitation. To understand this, consider a case where the market value of an investment of 100 made at the end of year declines to 80 at the end of year 1 and recovers to 100 at the end of year 2. Assuming that there is no dividend payment during the two year period, the annual returns and their arithmetic average are as follows :

Returns for year 1 : $\frac{80 - 100}{100}$ = -20 percent

Returns for year 2 : $\frac{80 - 100}{100}$

Arithmetic average of annual return : $\frac{-20 + 25}{2}$ = 2.5 percent

Thus we find that although the return over the two year period is nil, the arithmetic average of annual returns works out to 2.5%. So this measure of return can be misleading. Hence it should be avoided. This leaves us with the remaining two measures, viz the internal rate of return and the geometric mean rate of return.

How useful is the internal rate of return, also referred to as the money- weighted rate of return ? To answer this question let us look at the internal rate of return of time portfolios, A and B that experience different cash flows as shown in following exhibit

Cash Flows of Portfolios A and B

	Periods			
	1	2	3	4
Rate of return earned	10%	30%	20%	----
Portfolio A				
1. Beginning value before inflow or outflow.	10,000	11,000	14,300	17,160
2. Inflow (outflow)	--------	-------	--------	(17,600)
3. Amount invested	10,000	11,000	14,300	--------
4. Ending Value	11,000	14,300	17,160	---------
Portfolio A				
1. Beginning value before inflow or outflow.	10,000	11,000	3,900	4,680
2. Inflow (outflow)	--------	(8,000)	--------	(4,680)
3. Amount invested	10,000	3,000	3,900	--------
4. Ending Value	11,000	3,900	4,680	---------

In portfolio, A, an intiial investment of 10,000 grows to 17,160 at the end of the year 3, with no intermediate cash flows. Hence, its internal rate of return is the value of r that satisfies the equation.

$$10{,}000 = \frac{17{,}160}{(1+r)^3}$$

Solving this equation, we get the value of r to be 19.72%

In portfolio B, an initial investment of 10,000 results in cash flows of 8,000 and 4,680 at the end of the year 1 and 3 respectively. Hence, its internal rate of return is the value of r that satisfied the equation.

$$10{,}000 \quad \frac{8{,}000}{(1+r)} + 0 + \frac{4{,}680}{(1+r)^2\ (1+r)^3}$$

Solving this equation, we get the value of r to be 15.27%

This we find that though the period by period returns of both the portfolios are identical, the internal rate of return (or the money weighted rate of retturn) for portfolio A is greater than that for portfolio B. This is because the internal rate of return suffers from a limitation in that it is sensitive to the pattern of cash flows over which portfolio managers often have no control. Not that the internal rate of return reflects investment performance as well as the effect of contributions and withdrawals. Hence it is not correct so say that investment performance alone accounted for 15.27%. Indeed, you cannot judge the equality of investment performance from the internal rate of return figure. The internal rate of return however is useful in measuring the total experience of a fund, reflecting investment performance as well as cash flows.

The geometric mean rate of return (or the time-weighted rate of return) assigns equal weight to the result achieved in each time period and is independent of the pattern of cash flows. Hence, it is a superior measure. The geometric mean rate of return for both the portfolios shown in exhibit on page No. 32 is :

[1.10) (1.30) (1.20)] 1/2 - 1=0.1972 or 19.72 percent.

(a) Risk

The risk of a portfolio can be measured in various ways, The two most commonly used measures of risk are : variability and beta.

(b) Variability

The Bank Administration Insitute of the US recommended the use of variability [as measured by the mean absolute deviation (The mean absolute deviation of a set of returns of simply : ∑/d/n/where /d/ is equal to absolute deviation of a particular return from the arithmetic mean, n is equal to number of return observtions)] of the quarterly rates of return of the portfolio. Sharpe and other have also advocated the use of variability. However, their pereferred measure of variability is standard deviation.

(c) Beta :-

A measure of risk commonly advocated is beta. The beta of a portfolio is computed the way of the beta of an individual security is computed. To calculate the beta of a portfolio, aggress the rate of return of the portfolio on the rate of return of a market index. The slope of this regression line is the portfolio beta. Remember that is deflects the systematic risk of the portfolio.

2.2.13 Summary

It must be recognized that it is not feasible to evaluate the ability of a money manager over a short period of one of three years when it should be appraised over a period of five to seven years. As Peter O Dietz and Jeannette R. Kirsch man wrote. For accuracy of computations, performance should be computed as often as practical, but results should not be taken as significant by the investor or the investment manager until a reasonable period of time, such as a market cycle for equities or an interest rate cycle for fixed income securiteis has elapsed. The lesson discusses in detail the methods of portfolio selection, revision and of rebalancing. It also highlighted portfolio upgradation and the concept of portfolio performance evaluation with the help of different methods.

2.2.14 Glossary :-

(i) Portfolio Upgrading : It involves for re-assessing the risk return characteristics of various securities.

(ii) Performance Evaluation : It involves analysis of the measures of rate of return, risk and performance.

(iii) Porfolio Rebalancing : It involves reviewing and revising the portfolio computer (i.e. the stock bond mix).

(iv) Sector Rotation : It invovles shifting the weight for various industrial sector based in their absessed outlook.

2.2.15 Self Check exercise:

1. What is risk return trade off?
2. Explain the following:
   - Portfolio revision
   - Portfolio Rebalancing
   - Portfolio Upgrading

2.2.16 Questions for Exercise

Long Question

(i) Discuss the process of portfolio management.

(ii) Discuss the measures used for evaluating the performance of a portfolio.

(iii) How is the selection of asset mix done in portfolio management.

Short Question

1. Define Sector Rotation
2. Define portfolio
3. Define Portfolio Revision
4. Risk of a portfolio.

2.2.17 Recommended Readings

Investment Management : By Preeti Singh

Security Analysis & Portfolio Management - By V.A. Avadhani

Financial services & Markets - By G.S. Batra.

DEPARTMENT OF DISTANCE EDUCATION
PUNJABI UNIVERSITY, PATIALA
STUDENT'S RESPONSE SHEET

Roll No.....

BBA PART-III
SEMESTER-V

PAPER : BBA-512
INVESTMENT MANAGEMENT
LESSON No. 1.1-2.6
RESPONSE-SHEET No. 1 AND 2

Marks Obtained ..... %

Date of receipt of the lesson.....

Date and signature of the Examiner.....

Write your name and address below in BLOCK LETTERS :

Date of submission of Response-Sheet by the Student .....

No. of pages attached .....

Date of receipt in the Department .....

Total Marks : 40

Note : Attempt any two long questions. Short notes are compulsory.

Q.1. Define the term Investment. Discuss the difference avenues available to an investor for making investment.

Q.2 Discuss the process of portfolio management in detail.

Q.3. What is fundamental analysis ? How is it useful for prospective investors ?

Q.4 How is technical analysis different from fundamental analysis in investment management ?

Q.5 Short Questions :

1. Dow Theory
2. Elliot Wave Theory
3. Market Value v/s Intrinsic Value
4. Company Analysis

Please send this response-sheet alongwith your answers to : The Deputy Registrar, Department of Distance Education, Punjabi University, Patiala - 147 002

LESSON NO. 2.3

CONCEPT OF PORTFOLIO AND SHARPE MODEL - I

2.3.1 Objective

The chapter focuses on optimum portfolio selection under different models. It further put emphasis on life cycle approach. It also focuses on how one can pick up securities which provide maximum return at a predermined risk level.

2.3.2 Introduction

The objective of this chapter is to introduce the concept of combination of securities and henceforth calculating its risk and return. It is necessary to mention here that individuals hold large number of securities of different companies rather than that of a single company. Apart from the fancy of holding securities of different companies, it has got its benefits of yielding more returns than the yield from holding single company security. The chapter will explain how and why should we hold a variety of securities.

The modern portfolio theory believes in the maximization of return through grouping a certain number of securities together. It is not necessary to combine all Securities having minimum risk. Even by combining allow risk security with another high risk can also lead to success for an investor. The modern theory believes that risk underlying investment can be reduced by diversification. This can be done by investing in the securities of companies located in different regions, belonging to different industries or those producing different product lines.However, unlimited diversification is not called for. The securities must be evaluated and then diversified to a limited extent within which the optimum achievement can be sought by an investor.

2.3.3 Diversification : Its benefits and Limitations

The principle of diversification states that one should not put all the eggs in one basket. A portfolio consisting of a number of securties would enable an investor to earn

superior returns on his investment because his risk would be diversified and spread over a number of securities so that a loss in one security may be offset by a gain in others

Risk is the variability in the security's returns. Risk is composed of two parts- Systematic and Unsystematic. Systematic risk refers to that protion of total variability in return caused by factors affecting the prices of all securities. Economic, political and sociological changes are the source of systematic risk. Unsystematic risk is that portion of total risk that is unique to firm or industry. Such factors as management capability, consumer preferences, labour strikes, etc. cause unsystematic variability of returns in a firm.

Diversification can bring about a reduction in the unsystematic risk, also called as the diversifiable risk.However an investor has to be cautious so as not to get carried away by the idea of diversification. The investment should not be so spread about that it leads to "superfluous diversification" which would make the managing of too many investments both difficult and expensive.

2.3.4 The Markowitz Approach

Majority of us would concede to the point that a portfolio consisting of two stocks would be probably less risky than holding either stock individually. However there is a disagreement, over the right kind of diversification.Harry Markowitz approach for generating good portfolios has its roots in risk-return relationship. There are certain assumptions around whih the portfolio theory of Markowitz revolves. Few key assumptions are examined below :

(i) The market is efficient and it is not possible for the investors to make consistently superior returns either through technical analysis or through fundamental analysis.

(ii) All investors are basically risk averse.

(iii) All investors intend to earn the maximum return from their investments.

(iv) The rate of return and Standard deviation are important considerations in deciding upon the worth of an investment.

(v) Higher the risk,larger the return and vice-versa.

(vi) Risk can be curtailed by adding investments in the portfolio.

(vii) An investor must get higher return for each risk level by finding out the 'efficient set of securities'.

The Markowitz theory determines the efficient portfolio through three important variables, viz, return, standard deviation and coefficient of correlation.

2.3.4.1 Markowitzh Approach : Two Security Case :

When two securities having a negative correlation amongst them are included in a portfolio ; risk can be completely minimized because the gain on one can offset the loss on the other. Let us consider a simple situation. There are two securities A and B.

Their expected return and the proportionate investment in them is as follows :

Securities	Expected Return (RI)	Proportion (X)
A	15%	20%
B	25%	80%

In the above case, the return on the portfolio (Rp) by taking a combination of these two securities will be :

Rp = $\sum xi\ Ri$ $\sum xi\ Ri$

= $(0^a\ 15^a)\ (0^b\ .\ 20) + (0.25)(0.80)$

= 23%

Not let us reconstruct the above example with fresh data in order to make the Markowitz two security analysis.

Assume the followingsecurities X and Y

	Security X	Security Y
Return (%)	7 or 11	13 or 5
Probability	0.5 each return	0.5 each return
Expected Return (%)	9*	9**
Variance %	4	16
Standard Deviation	2	4

It is clear that although X and Y have the same expected return i.e.

* Expected Return = (0.5(7) + (0.5) (11) = 9

** Expected Return = (0.5) (13) + (0.5) (5) = 9

9%, Y is riskier than X (standard deviation being 4 and 2 respectively). Suppose that when X's return is high, Y's return is low and vice-versa. In other words, when the return on X is 11% and that on Y is 5% or when the return on X is 7%, the return on Y is 13%. An investor would be interested in knowing as to whether there is a portfolio consisting of same X and some Y which would be superior to an exclusive holding of X alone (has it less risk ?).

Les us construct a portfolio consisting of two-third stock of X and one-third stockof Y.The everage return on this portfolio can be though of as the weighed average return of each security in the portfolio ,i.e.. ;

$$Rp \sum_{i=1}^{N} Xi\ Ri$$

Where

Rp = Expected return on the portfolio

X = Proportion of total portfolio in security i

R^i = Expected return on security i

N^i = Total number of securities in a portfolio

Therefore,

Rp = (2/3) (9) + 1/3 (9) = 9

In periods when Y is better an investment,

Rp = (2/3) (7) + 1/3 (13) = 9

and in periods where X turns out to be more remunerative,

Rp = (2/3) (11) + 1/2 (5) = 9

It is clear that by putting a part of the money in the riskier stock Y, risk can be reduced considerably from what it would have been if we had confined out purchases to the less risky stock, X.If we hold only stock X,the expected return would by 9% which could, in reality,be as low as 7% in bad periods or as much as 11% in good periods because the standard deviation is 2%. Holding a mixture of two-thirds X and of one-third Y, the expected and experienced return will always be 9% with a Standard deviation of Zero.

2.3.4.2 Markowitz Approach : The risk of a Portfolio :

The riskiness of a portfolio can be defined by simply finding out the risk complexion of individual securities. It is also important to know the interactive risk between the securities, or the co-variance.

The interactive risk or the co-variance would be considered as positive if the rate of return of two securities move together and vice versa. Co-variance would be Zero if the rates of return are independent. The formula for computing co-variance is :

$Cov_{xy} = \frac{1}{N} \sum (R_x - \overline{R_x})(R_y - \overline{R_y})$ were, the probabilities are equal and

N = Number of observations

Cov_{xy} = Covariance between x and y

R_x = Return on Security x

R_y = REturn on security y

$R_x$and R_y = expected returns on Security x and y.

Another popular measure used to find out the similarity or dissimilarity in the behaviour of two variables is the coefficient of correlation, which is expressed as :

$$r_{xy} = \frac{Covxy}{QxQy}$$

r_{xy} = Coefficient correlation of x and y

COV_{xy} = Covariancebetween x and y

Q_x = Standard deviation of x

Q_y = Standard deviation of y.

It is evident that by investing in securities which have a low convariance amongst

1. *Fisher, Donald E.Jordon, Ronaid, J., Security Analysis and Portfolio Management, Fifth edition, PrenticeHall of India,New Delhi, 1992. P-639*

themselves,it is possible to reduce risk. Markowitz contends that an efficient diversification would be one which would reduce risk in the portfolio without doing away with any of the portfolio's return. This would be achieved in those securities grouped together which have lessthan positive correlation amongst them. Markowitz thus says that it is not enough to invest in many securities, it is necessary to invest in the right securities.

In a two-securitiy portfolio, the risk of a portfolio can be thus expressed as :

$$\sigma_p = \sqrt{X_x^2 \sigma_x^2 + X_y^2 \sigma_y^2 + 2 X_x X_y r_{xy} \sigma_x \sigma_x}$$

σ_p = Standard deviation of the portfolio

Xx = Percentage of total portfolio value in stock X

Xy = Percentage of total portfolio value in stock y

σ_x = Standard deviation of stock X

σ_y = Standard deviation of Stock y

r_{xy} = Correlation coefficient of x and y

Let us analyse in the interactive risk by considering our previous example :

	Return	Expected Return	Difference
	Stock X	7	9	-2
	Stock Y	13	9	+8
				Product -8
	Stock X	11	9	+2
	Xtock Y	13	9	+8
				Product -8

Co_{vxy} = 1/2 [(7-9) (13-9) + (11-9) (5-9)]

$$= \frac{1}{2}[(-8) + (-8)] = \frac{16}{2} = 8$$

$$F_{xy} = \frac{8}{(2)(4)}$$

$$= \frac{8}{8} = 1.0$$

Risk can be totally eliminated if r_{xy} = 1.0 and the percentage of the portfolio Q.

in stock x is set equal to $X_x = \frac{Q_y}{Q_x + Q_y}$

It is easy to detect whether any diversification effect has occured or not. In casethere is no diversification effect, the total risk of the two securities wouldbe simply the weighted of their individual standard derivations. A favourable portfolio effect would occur only when securities are not perfectly positively correlated. It means they

should be un-related to each other.

2.3.4.3 Markowitz Approach : Three Security Portfolio :

The expected portfolio return in a three security portfolio would be computed on the similar lines as was in the case of two security portfolio.

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

Similarly, the standard deviation of a portfolio would depend on the standard deviations of the return of its components, their correlation coefficient and the proportions invested.

$$\sigma^2 p = \sum_{i=1}^{N} \sum_{j=1}^{N} X_i X_j Cov_{ij}$$

where

Xi = proportion of total portfolio invested in security i

Xj = proportion of total portfolio inested in security j

consider the following information :-

Security	Expected	Proportion	Standard Deviation	Coefficient of Correlation
	10%	20%	0.2	r12 = 0.5
	15%	20%	0.3	r13 = 0.1
	20%	60%	0.5	r23 = 0.03

Return from the above portfolio shall be :

Rp = (.10) (.20) + (.15) (.20) + (.20) (.60)

= (0.02 + 0.03 + 0.12

= 17%

$$\sigma^2_1 = X^2_1 \sigma^2_1 + X^2_2 \sigma^2_2 + X^2_3 \sigma^2_3 + 2X_1 X_3 r_{13} \sigma_1 \sigma_2 + 2X_2 X_3 r_{23} \sigma_2 \sigma_3 + 2X_1 X_3 r_{13} \sigma_1 \sigma_2$$

= $(0.20)^2 (0.2)^2 + (0.2)^2 (0.3)^3 + (0.6)^2 (0.5)^2$

= +2 (0.2) (0.2) (0.5) (0.2) (0.3)

= +2 (0.2) (0.6) (0.3) (0.2) (0.5)

= +2 (0.2) (0.6) (0.1) (0.2) (0.5)

= 0.0016 +0.0036 + 0.009+ 0.0024 - 0.0108 + 0.0024

= 0.0892

$\sigma_y = \sqrt{0.0892}$

= 0.29866

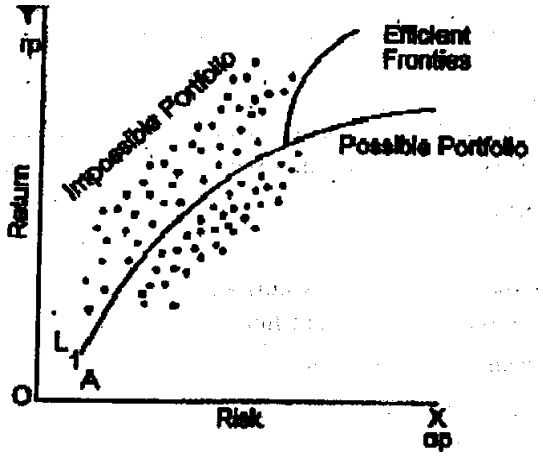
Portfolio risk = 0.3

Now, we can see it has reduced the risk to a great extent.

2.3.4.4 The Efficiency Frontier :

What we have done in the above example is that we have computed the return and

risk of a three security portfolio which is one of many three security combinations. The above case is just one amongst a plethora portfolios. However, inspite of being feasible it could be termed as inefficient if there were other portfolios which exceeded its return as the same level of risk or had lower risk for the same level of return. Consider the following figure.



In the figure, point L, is the least risk portfolio for a given level of return R_1,It can be seen that there are no Portfolio which lie to the left of L1 and as such is the efficient portfolio at that level of return. The focus of points from also B is the end result of this tracing process. This locus of points is called the efficient frontier. The line AB divides the space betwen portfolios that are "possible' and those which are "impossible" or can't be attained.

The Markowitz model could be expanded to explain the case of a N-Security portfolio. The inputs for such a portfolio analysis would be; (i) N expected returns,

(ii) N variances of return

e_{N^2} ■ Nj $\frac{N\,b_N\,3g}{}$ ■

(iii) $\frac{}{2}$ Covariances, making a total of $M\ 2\ PQ$

Separate pieces of information so as to compute efficient portfolios.

2.3.5 Sharpe's Model :

William Sharpe made an attempt to reduce the data requirements for portfolio construction and thus, to simplify the process of solving the problem of reaching an efficient portfolio. Sharpe's Index model assumes that the securities are not only related to each other in individual capacity but they are related to each other through some indexes represented by business and economic activity.Sharpe's index condiders 3N+2

bits of information as against $\frac{N(N-3)}{2}$ bits of information by Markowitz's model. Thus,

if a portfolio of 10 securities were to be constructed Markotwitz's model would require $\frac{10(10-3)}{2}$ = 65 bits of information whereas Sharpe's index model would require only 3 (10) + 2 = 32 bits of information.

Sharpe has simplified the portfolio construction model by doing away with the co-variances of the expected return on a security can be found out as follows :

$R_i = X_i + B_1 I + e_i$

where,

Ri	=	Expected return on security i
x_i	=	Intercept of a straight line
βi	=	Scope of straight line
I	=	Level of market / index
ei	=	Error term

Alpha (Xi) is the value of Y when X in a regression equation (Y = αi + β) is 0. The beta coefficient helps in measuring the stock's return in re-sponse to movement in the market's returns' e.g. ; a beta of + 1.0 would mean that on a 1% return the market index is matched by a 1% return on the stock.

For portfolios, a weighted average of the estimated returns for each security in the portfolio is requires to know the return on the portfolio. For each security x and B estimated would be required apart from one estimate of market index. The weights will be the proportions of the portfolios devoted to each security. Thus,

$$R_p = \sum_{i=1}^{N} X_i (\alpha_i + \beta_i 1)$$

Further, the coefficient of determination can be computed to find out the percentage of the variance of security's return that is explained by the variation of return in the index.

Sharpe observed that the variance explained by index could be referred to as the systematic risk. The unexplained variance is called the residual variance or unsystematic risk.

According to Sharpe :

Systematic risk	=	B^2 x Variance of Index
Unsystematic risk	=	(Total Variance of Systematic risk security return) (Systematic risk)
	=	e2

Total risk = $\beta^2 \sigma_1^2 + e^2$

and portfolio variance is

$$\sigma^2 p = \left[\sum_{i=1}^{N} X_i \beta_i\right]^2 \sigma_1^2 + \sum_{i=1}^{N} X_i^2 e_i^2$$

Let us take a simple example by considering five year data on a hypothetical security A and the market in index.

Year	Return on Security A	Return on Market Index
1	0.29	0.10
2	0.31	0.24
3	0.10	0.11
4	0.06	0.08
5	0.07	0.03

Let us remember that the β measures the systematic risk, x measures the unsystematic risk.The epsilon, e, the indicates the level of unsystematic risk.Let us proceed to computer these measures :

Year	X	Y	XY	X2	Y2
1	0.10	0.29	0.0290	0.0100	0.0841
2	0.24	0.31	0.0744	0.0576	0.0961
3	0.11	0.10	0.0110	0.0121	0.0100
4	0.08	0.06	0.0048	0.0064	0.0036
5	0.03	0.07	0.0021	0.0021	0.0049

$\bar{x} = .11$

$\bar{y} = .17$

(i) Beta or Slope of the line :

$$\beta = \frac{n \sum xy - \left(\sum x\right)\left(\sum y\right)}{n \sum x^2 - \left(\sum x\right)^2}$$

$$= \frac{5(0.1213) - (0.56)(0.83)}{5(0.0870) - (0.56)^2}$$

$$\frac{0.6065 - 0.4648}{0.4350 - 0.3136}$$

$$= \frac{0.1417}{0.1214}$$

$= + 1.2$

(ii) Alpha or the Intercept of the line :

$\bar{x} - \bar{y} \beta X$

= 0.17 - (1.2) 0.11)

= 0.17.0 - 0.132

= 0.048

(iii) Residual Variance (Unsystematic risk) :

$$e^2 = \frac{\sigma_y^2 - X\sigma_{xy} - \beta\sigma_{xy}}{n}$$

$$= \frac{0.1087 - (0.048)(0.83) - (1.2)(0.1213)}{5}$$

$$= \frac{0.1987 - 0.398 - 0.1455}{5}$$

$$= \frac{0.9134}{5}$$

= 0.00268

Beta is also defined as follows :

$$\beta = \frac{Cov_{im}}{\sigma_m}$$

where,

Cov_{im} = Co - variance between the returns Security i and the market.

σ_m = Standard deviation of market's return.

(d) Correlation :

$$r_{xy} = \frac{n\sigma_{xy} - (\Sigma x)(\Sigma y)}{\sqrt{n\sigma_x^2 - (\Sigma x)^2}\ n\sigma_y^2 - [\Sigma y]^2}$$

$$= \frac{5(0.1213) - (.56)(0.83)}{\sqrt{5(0.0870) - (0.56)}\ \sqrt{5(0.1987) - (0.83)}}$$

$$= \frac{0.6065 - 0.4648}{\sqrt{0.4350 - 0.3146}\ \sqrt{0.9935 - 0.6889}}$$

$$= \frac{0.1417}{\sqrt{0.1214}\sqrt{0.2046}}$$

$$= \frac{0.1417}{0.1576}$$

= + 0.899

Varinace :

Return on Security A (x)	Deviation	(d_x^2)
0.29	0.12	0.0144
0.31	0.14	0.0196
0.10	0.07	0.0049
0.06	-0.11	0.0121
0.07	-0.07	0.0100
0.83		0.0610

$$\sigma = \sqrt{\frac{\sum dx^2}{N}}$$

$$= \sqrt{\frac{0.0610}{5}}$$

$$= \sqrt{0.122}$$

$$= 0.11$$

Varinace = 0.122

(f) Co-efficient of determination (r) 2 = 0.808

(g) Variance explained by Index = (0.0122) (0.808)

(Systematic risk) = 0.0098

(h) Variance not explained by Index = (0.0122) (0.192)

(Unsystematic / Residual risk) = 0.0023

We can, therefore, summarize the equation put forward by sharpe as follows :

Variable	Relationship to Market	Interpretation
α (Alpha)	Positive	Stock is better than the market
	0	Stock performance is the same as market
B	Negative	Stock performance is worse than the market
(Beta)	Higher the 1	Very risky
	0	Same as the market
	Less than 1	Less risk
e	Higher than	Worse than the market
Epsilon)	Zero	Same as the market
	0	
	Less than zero	Less risky

2.3.6 Two Models Compared

Markowitz Model Utility Concept	Sharpe Model
Utility of a portfolio is risk adjusted return. It is equal to portfolio returns minus risk penalty	Optional portfolio is setup by using the single model of Sharpe. The durability of any stock is directly related to its excess return to Beta ratio, viz.
where risk penalty = Risk squared / Risk Tolerance	Sharpe Index = $\frac{R_j - R_f}{B_j}$
It is portfolio risk,relative to the investor's risk to brave the optional portfolio is one on the efficient frontier that maximise utility to generate efficient portfolios the Markowitz Modelrequires : (a) Expected return on each asset (b) Standard deviation of returns as a measure of risk of each asset (c) The covariance of correlation coefficients as a measure of inter-relationship between the returns on assets considered.	Where Rj expected return on stock Rf = risk free return Bj = Beta relating to **J** stock to the market return. Then rank all the stocks in their order of the index value. In Sharpe Model,the return on any stock depends upon some constant called Alpha plus coefficient called B (Beta), times the value of a stock Index (I),plus a random component. The equation is $R_i = x_i + B_i I + e_c$ in Sharpe Model.

2.3.7 Summary

Investors wish to maximise return on their investments.Using the ideas of Markowitz and Sharpe we learned, that portfolios are packagesof securities that are constructed by knowing the return and risks on individual securities and also their interactive risk that exists between securities : Sharpe simplified the process of security analysis by linking it with market return. Lastly, we have compared both the Markowitz and sharpe models of security analysis.

2.3.8 Glossary

1.	Portfolio	:	Combination of securities
2.	Portfolio Analysis	:	Determination of future risks and return in holding various combination of securities.
3.	Risk	:	Standard deviation from the expected return.
4.	Diversification	:	Holding a number of securities to spread

risk.

5.	Interactive risk	:	It is the covariance, i.e.collective risk,when two or more securities are combined which is generally greater than or less than their simple addition.
6.	Efficient Frontier	:	It is the line that desides portfolios into possible and impossible ones.
7.	Systematic risk	:	Non diversifiable risk.
8.	Unsystematic risk	:	Diversifiable risks.

2.3.9 Self Check Exercise:

1. Explain Diversification
2. What are the benefits of diversification
3. What is Sharpe Model

2.3.10 Exercise Questions :

Long Question

Q.1 How many inputs are needed for a portfolio analysis involving 50 securities if co variances are computed using :

a. Markowitz Technique.
b. Sharpe Index method

Q.2 Contrast and compare with illustration Markowitz and Sharpe model of security analysis.

Short Question

1. What are benefits and limitations of divercification?
2. Explain Markowitz approach of portfolio.

2.3.11 Suggested Readings :

1. Investment Analysis and Portfolio management -Prasanna Chandra-TMH-2nd Edition, 2005.
2. Investment-Zvi Bodie, & Mohanty-TMH-6th Edition, 2007.
3. Investment Management-VK Bhalla (S.Chand & Co.), 2009.
4. Investment Analysis & Portfolio Management-Reilly-8/e-Thomson/Cengage learning.
5. Security Analysis & Portfolio Management-Fisher and Jordan, 6/e Pearson/PHI, 2009.
6. Alexander, Sharpe, Bailley-Fundamentals of Investment-Pearson/PHI, 2009.
7. Portfolio Management-Barua, Verma and Raghunathan (TMH), 1/e, 2006.
8. Reilly & Brown-Investment Analysis & Portfolio Mgmt.-Thomson Learning, 7/e, 2007.
9. Ranganathan & Madhumathi-Investment Analysis & Portfolio Mgmt.-Pearson, PHI.
10. Punithavathy Pandian - Security Analysis & Portfolio Mgmt.- Vikas Publications, 2009.
11. Practical Investment Arrangement-Strong-Thomson/Cengage Learning 3/e.
12. Fischer Donald E., Jordan Ronald J. Security Analysis and Portfolio Management, Prentice hall of India, New Delhi.
13. V.A. Avadhani, Investment Management, Himalaya Publishing House,

Mumbai, 2003.

LESSON NO. 2.4

Portfolio theory and sharpe model-II

2.4.1 Objective

The chapter focuses on optimum portfolio selection under different models, It furthrt put emphasis on Life Cycle approach. It also focuses on how one can pick up securities which provide maximum return at a predetermined risk level.

2.4.2 Introduction :

In the preceeding chapter, we have seen two techniques of evaluating the securities. In the present chapter, we shall proceed further, and pick up securities which provide us maximum return at a predetermined risk level we have stated that we can tolerate and the proportion etc. devotion of our funds to each type of security.

2.4.3 Corner Portfolios

Its studied in the last chapter : Markowitz used the quadratic programming technique to trace out the efficiency locus and to identify the efficient portfolio. To recapitulate, efficient portfolio is the one which provides more return at the same level of risk.

With the help of a computer, the Sharpe model can be used to generate a series of corner portfolio rather than an infinite number of points along the efficient frontier. A corner portfolio is the one in which a security either joins or leaves the portfolio. The number of securities usually increases as we move downwards along the efficient frontier. The last corner portfolio would be the one which would yield the lowest return for minimum risk.

The maximum /minimum percentage that can be devoted to any one security in the portfolio determines the actual number of stocks that would enter into a given efficient portfolio.

We shall shortly proceed to discuss the process for determining the optimum portfolios.

2.4.4 The Optimum Portfolio Selection

The optimum portfolio is one that has minimum risk with higher return.

2.4.4.1 The Markowitz Portfolio Optimization :

The utility of a portfolio, which is simply the risk adjusted return from it, acts as a fairly easy principle for choosing the best portfolio.It can be termed the Utility of a portfolio, the utility of a portfolio is the difference between the expected return from it and the risk penalty. The risk penality further depends on two factors, viz; the portfolio risk and the risk tolerance of an investor.Mathematically.

$$\text{Risk Penalty} = \frac{Risk\ squarred}{Risk\ tolerance}$$ Utility = Portfolio's expected return - Risk Penalty

For the sake of an example, let us consider that the expected return from the portfolio is 20 percent, Variance of return is 300 percent and the investor's risk tolerance is 40. The risk penalty would be 7.5 percent. The utility of the portfolio will be obviously 12.5%. The utility maximising portfolio will be the optimum or the best portfolio.

$$\text{Risk Penalty} = \frac{300}{40} = 7.5\%$$

Utility = 20 - 7.5 = 12.5

2.4.4.2 The Sharpe's Portfolio Optimization

If it were possible to find a single number that would measure the desirability of stock for its being selected in the best portfolio, the problems of constructing an optimum portfolio would be quite simplified. Sharpe's index model provides such number.According to Sharpe's model,the 'excess return to beta' ratio would determine the desirability of any security.

$$\text{Excess Return to Beta Ratio} = \frac{R_i - R_f}{\beta_i}$$

where

R_i = Expected return on stock i.

R_F = Return on a risk free asset

R_{ui} = Expected change in the rate of return on stock i, associated with a one percent change in themarket return.

The selecting of number of stocks would depends on a cut-off rate such that the stocks having a higher ratio would be included in the portfolio where as the stock with lower ratio would be excluded.

The steps required for deciding the stock to be included in the optimum portfolio would be to :

(i) Compute the excess return to Beta ratio for every stock.

(ii) Rank the stock from the highest to lowest ratio.

(iii) Select the stocks having a ratio that is higher than a specific cut off rate, C, which is computed as follows for a portfolio of i stocks.

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^{i} \frac{(R_i - R_F)\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^{i} \frac{\beta_i^2}{\sigma_{ei}^2}}$$

where,

α^2m = Variance in the market index

α_{ei}^2 = Variance in the movement of the stock which is not associated with the movement of the market index; i.e. the unsystematic risk of the stock.

Sharpe's Portfolio Optimization : - An example :

Date required to consturct an optimum portfolio is given below in the table : R1 = 5%

Security No. (f)	Mean Return (R)	Excess Return $(R_i - R_f)$	Beta (B) (B_i)	Unsystematic Risk σ_{ei}^2	Excess Return over Beta $\frac{(R_i - R_f)}{B_i}$
1	15.0	10.0	1.0	50	10.0
2	17.0	12.0	1.5	40	8.0
3	12.0	7.0	1.0	20	7.0
4	17.0	12.0	2.0	10	6.0
5	11.0	6.0	1.0	40	6.00
6	11.0	6.0	1.5	30	4.0
7	11.0	6.0	2.0	40	3.0
8	7.0	2.0	0.8	16	2.5
9	7.0	2.0	1.0	20	2.0
10	5.6	0.6	0.6	6	1.0

Calculations for determining the cut off rate with a2m = 10

Security	$\frac{R_i - R_f}{\beta_i}$	$\frac{(R_i - R_f)B_i}{\sigma_{ei}^2}$	$\frac{B^2}{\sigma^2 ei}$	$\sum_{j=1}^{i} \frac{(R_i - R_f)B_i}{\sigma_{ei}^2}$	$\sum_{i=1}^{i} \frac{B^2}{\sigma_{ei}^2}$	C
1	10	2/10	2/10	2/100	2/100	1.67
2	8	4.5/10	10/10	5.625/1006	12.625/100	3.69
3	7	3.5/10	10/10	5/100	12.625/100	4.42
4	6	24/20	34/10	40/100	52.625/10	5.43

5	6	1.5/10	35.5/10	2.5/100	55.125/100	5.45
6.	4	3/10	7.5/100	38.5/10	62.625/100	5.30
7.	3	3/10	10/100	41.5/10	72.625/100	4.91
8.	2.5	1/10	4/100	42.5/10	76.625/100	4.75
9	2.0	01/10	5/100	43.5/10	81.625/100	4.75
10	1.0	0.6/10	6/100	44.1/10	87.625/100	4.52

The optimum Ci is the one where all securities used in the computations of Ci have excess returns to betas above Ci and all securities not need to compute Ci have excess return to betas, below C_iC_2 serves the role of a cut-offrate in the way a cut off rate has been defined. There is always one and only one Ci which can serve as the cut-off rate.

2.4.5 Arriving at The Optimal Portfolio :

It is not sufficient toknow as to which securities willbe included in the best portfolio. It must also be know the percentage of investment in each security.

The percentage of investment in such security can be found out as follows :

$$x_i^0 = \frac{Z_i}{\sum Z_j}$$

where,

$$Z_i = \frac{2}{100}(100 - 5.45) = 0.091$$

where

C* = Cut off rate

Therefore,

$$Z_1 = \frac{\beta_i}{\sigma^2 ei}\left(\frac{Ri - Rf}{\beta_i} - C^*\right)$$

$$Z_2 = \frac{375}{100}(8 - 5.45) = 0.095$$

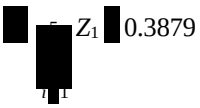
$$Z_3 = \frac{5}{100}(7 - 5.45) = 0.0775$$

$$Z_4 = \frac{20}{100}(6 - 5.45) = 0.010$$

$$Z_5 = \frac{25}{100}(6 - 5.45) = 0.0137$$

---

1. Fisher, Donald E. Jordon, J., Security Analysis and Portfolio Management OptimizationPortfolio of Indian : 1992, pp. 675-678



Dividing each Z_i be the sum of Z_i 23.5 percentof the funds would be invested in Security 1, 24.6 percent in Security 2.20 percent in Security 3, 28.4 percent in Security 4 and 3.5 percent in Security 5.

2.4.6 The Importance of Beta in a Portfolio :

The value of beta has to be compared with the market when it is used for the purpose of selecting securities. A profitable portfolio can be constructed by carefully analysis the relationship of beta coefficient with market prices. In a rosy market sitution, Securities with large beta coefficients can be selected. Such Securities would be risky but when the market is bullish,a high risk is likely to be associated with a high return. If the trend reverses itself then one can short sell the Securities having a high positive beta coefficient. The Securities having a negative beta coefficient would be able to face upto a fall in fall in market prices in the bearish phase.

Care must, however, be taken while selecting the Securities on the basis of the beta coefficient.There are certain preconditions which must be fulfilled while basing a decision on the beta coefficient. They are :

(i) A careful analysis of the market movement in both positive and negative directions.

(ii) The past behaviour of the beta coefficient must be analysed properly so that the further value of beta coefficient can be predicted precisely.

(iii) While scrutinzing the historical beta coefficients, one should not lose sight of the face that though past Beta values are useful, meaningful prediction requires forward looking estimates.

(iv) It must be kept in mind that beta does not explain any cause effect relationship between market and security returns. Actually,both market and security returns depend on a third variable the economy.

Fundamental security analysis can thus be gainfully used to explain the relationship between a Security's return and the broad economic activity. Such beas are called the fundamental betas.

One of the ways of forecasting fundamental betas is through the relative response coefficients, which is simply the ratio of anticipated response of a security to the anticipated response of the market in case both the market and the security in question are affected by the same event.

Summarily the beta of a security would depend on :

(i) The extent of influence of various types of economic events on the market variance.

(ii) The relative response coefficients.

In other words, the beta coefficient of a security will change in case the variance due to various economic events changes or there is a change in the response coefficients.

It can no longer be derived that a description regarding the future behaviour of a portfolio depends significantly onthe exactness of the predicted beta coefficient. Also,the level of risk of a wall diversified portfolio will depend alot on the fact as to how do the constituent securities react to the moves of the market.Only forward looking betas would, therefore, be of any use.

This all would require not only a proper appreciation of the economics of the relevant industry but also the operating and financial leverage of the companies coupled the other fundamental factors and the relative response coefficients.

We are now in a position to have a deeper insight into the risk complexion of a portfolio. The unsystematic or residual risk canbe further broker down into, (i) Specific risk and (ii) Extramarket Covariance.

The uncertainity in the returns due to firm specific events is called specific risk whereas the remaining component of residual risk is known as the extramarket covariance. The tendency of the securities to move together is called the covariance and the term extrtamarket refers to the those co-movements which are not associate with market movements.

As we know, all firms are effected by systematic risk whereas, specific risk affects only one firm.Extramarket covariance affects a group of similar firm.

The construction of a well-balanced portfolio would necessitate an estimation of all these elements of risk.Specific risk would be significant in case of individual securities. For a properly diversified portfolio, systematic risk would be most important whereas in case of a portfolio which has a concentration of securities belonging to particularindustry, extramarket,co-variance would be most important.

2.4.7 Traditional Portfolio Selection :

There are certain basic principles underlying the traditional portfolio construction.

(i) An investor likes to have larger returns from securities.

(ii) Returns can be increased if more risk is taken.

(iii) High returns further depend upon the investor's judgement of risk as well as his risk tolerance.

(iv) Committing the investible funds to many securities can reduce risk.

The portfolio constructions would entail a general process, the steps of which are examined as follows :

(i) An estimate of minimum acceptable income to an investor is require for which an insight into family and economic factors of the investor is a must.

(ii) Risk tolerance would be more if the principal in relation to the minimum investment income required is large.

(iii) The ability to take risk of a loss in purchasing power of investment income would be yield means if the investment income earned from the current basis. The greater the need for protection against inflation, the more the emphasis shifts towards common stock investments.

Thus, while deciding on the optimum portfolio,a prudent investor would not only consider the kinds of risks but also the level of risk of each type that he can tolerate. Apart fromthe risk factors certain non-risk factors such as taxation and market ability would also be taken into account by the investor.

There is a common aim of all portfolio, viz; to provide multiplicity of assets so that the owner of the portfolio is able to meet his expenditures from the portfolio income now or in future. However,it is almost impossible to know the worth of the assets over a period of time.Also, it is difficult to calculate about the purchasing power of the assets.It is, therefore, the time horizon and the liquidity, which go a long way in determining that acceptable level of risk to an investor.

2.4.8 The Life Cycle Approach : The risk and return preferences of an individual can be depicted in terms of phase of his 'life-cycle'.A young person can take a larger amount of risk and can hope to achieve higher returns. An individual in his middle age would like to have such investment avenues which would assure his to pension benefits because of reduction in his working life span. When the same individual takes retirements, he wants stability of return and regularity of income as his main considerations for investment. He would regularity of income as his main consideration for investment. He would then, obviously, take lesser risk for a low but consistent income.

The constraints which an individual investor faces are also as diverse as his investment objectives.

Individual liquidity needs present one set of such contraints. Liquidity needs vary from person to person and as such have a high variability across individuals, e.g., if an individual has such assets like real estate which may not have a ready market, liquidity needs for such a person would be relatively high which would have to be carefully estimated and liberally funded.

The planning period of investments is another important and a highly variable factor. The time horizon is perhaps as important as the considerations for risk and return.As per the life cycle approach, younger investors may have a relatively longer time horizon in which to take care of the ups and downs inherent in the risky combinations of assets. The time horizon would naturally reduce for the older investors and they would, therefore, prefer to portfolio with a shorter maturity period.

The portfolio choices would also be constrained by the tax consideration. The investors who fall under higher taxation brackets would like to put a fixed proportion of their

income in a portfolio having diverse government securities if their taxable equipment expected return exceeds that of taxable issues of equal risk.These investors will perhaps invest in the equity portion portfolio in a diversified group of stock with large capital gains as compared to the dividend income for a given risk.

2.4.9 Investment objectives and constraints : An example :

Mr. Ramesh, a 30 year old is an accounts manager in a medium scale concern.Hiswife, who is 27 years old is an teacher in the senior secondary school. They plan to have children in about a year or two.

Both have inherited property which is roughly worth Rs. 3,00,000/- and Rs. 1,50,000/- as cash. They plan to save about Rs. 1,50,000 every year and they seem to have reasonable good careers in the time to come.They would perhaps wants to have a financial plan which could be flexible enough to incorporate any change in their circumstances.

Their investment objective would be to have as much return as possible by assuming as lightly above average level of risk.Their risk taking capability can be more as they have reasonably assured jobs and they have a fair amount of inherited property. Further, they are able to save decent amount every year.

Talking of investmentcontraints,their liquidity needs are minimum,they have a long term time horizon because they are still young and have an apparently certain and forceable future.Both all under a low-medium tax bracket and have no pressing family responsibilities. Also they do not have legal constraint.

They would,thus, be advised to maximize growth in total return. They can undertake an above-average risk for the same.

2.4.10 Summary

Thus,this chapter provided both traditional and modern approaches (Markowitz, sharpe) to portfolio selection. The lesson describes various methods to arrive at optimum portfolios. Further thoughts are also provided on the signifiance of beta.The chapter ends with an example showing low these methods can be applied.

2.4.11 Self Check Exercise

1. What is optimum portfolio
2. Explain Life Cycle approach

2.4.12 Glossary

a. Corner Portfolio : On the efficient frontier, it is the point where portfolio either enters orleaves.

b. Utility : Expected return -risk penalty

c. Optimal Portfolio : The portfolio (a) which provides maximum return at our stated risk ssumed level or (b) Minimizes risk at our prestated return level.

2.4.13 Exercise Questions

Long Question

1. Strike out the difference between portfolio selection technique provided by Markowitzand Sharpe.
2. How traditional portfolio selection method different from the earlier studied method?

Short Question

1. What are different moderl for portfolio optimization
2. What is life cycle approach.

2.4.14 Suggested Readings

1. Investment Analysis and Portfolio management -Prasanna Chandra-TMH-2nd Edition, 2005.
2. Investment-Zvi Bodie, & Mohanty-TMH-6th Edition, 2007.
3. Investment Management-VK Bhalla (S.Chand & Co.), 2009.
4. Investment Analysis & Portfolio Management-Reilly-8/e-Thomson/Cengage learning.
5. Security Analysis & Portfolio Management-Fisher and Jordan, 6/e Pearson/PHI, 2009.
6. Alexander, Sharpe, Bailley-Fundamentals of Investment-Pearson/PHI, 2009.
7. Portfolio Management-Barua, Verma and Raghunathan (TMH), 1/e, 2006.
8. Reilly & Brown-Investment Analysis & Portfolio Mgmt.-Thomson Learning, 7/e, 2007.
9. Ranganathan & Madhumathi-Investment Analysis & Portfokio Mgmt.-Pearson, PHI.
10. Punithavathy Pandian - Security Analysis & Portfolio Mgmt.- Vikas Publications, 2009.
11. Practical Investment Arrangement-Strong-Thomson/Cengage Learning 3/e.
12. Fischer Donald E., Jordan Ronald J. Security Analysis and Portfolio Management, Prentice hall of India, New Delhi.
13. V.A. Avadhani, Investment Management, Himalaya Publishing House, Mumbai, 2003.

LESSON NO. 2.5

CAPITAL ASSET PRICING MODEL : TESTS & APPLICATIONS (Adapted from "Modern Investment and Security Analysis" by Russel J. Fuller and James L Orell,J.)

2.5.1 Objective

The chapter focuses on studying the tests & applications of capital asset pricing model. The model is an extension of Markotwitz theory of portfolio. The chapter also include the concepts of capital market line and security market line.

2.5.2 Introduction

Capital market theory is a major extension of the portfolio theory of Markowitz.Portfolio theory describes how National investors should build portfolios.Capital market theory tells us how assets should be priced in the market if everyone behaved as per portfolio theory.The capital asset pricing model (CAPM) is a relationship explaining how assets should be priced in the capital markets.

The capital asset pricing model was developed on the basis of the portfolio theory of Harry Markowitz which has already been discussed in earlier lesson. The modelwas given a formal shape by William Sharpe, in 1964. John Lintner[2] in 1965 and Jan Mossin[3] in 1967

2.5.3 Assumptions of the Model

The capital asset pricing model (CAPM) has straight forward implications with respect to the behaviour of security prices, the expected risk-return relationship and the

1. Sharpe,William F. "Capital Asset Prices A Theory of Market Equilibrium under conditions of Risk, "Journal of Finance" Vol. 19 No. 3,September 1964
2. Lintner, Joshi, "Security Prices, Risk and Maximal GAins from Diversification". Journal of Finance,Vol. 20, No. 12, December 1965.
3. Mossin Jan, "Equilibrium in a Capital Asset Market", Econometrieia Vol. 34, No. 4, 1966.

appropriate measure of risk for securities.As the model is built heavily around the Markowitz's theory, it automatically makes the following assumptions.'

(i) Investors are risk averse and expected utility maximizers.

(ii) Investors select portfolioson the basis of their expected mean and variance of return.

(iii) There is a single holding period that is the same for all investors. However, if a model, that were to reach beyond the implications of portfolios theory, was to be developed, it required more stronger assumptions.Let us look at these additional assumptions.

(iv) There is an unrestricted borrowing and lending at the risk free rate.

(v) Investors have homogenous expectations regarding the means, variances and co-variances of security returns.

(vi) There are no taxes and no market imperfections such as transaction costs.

On the basis of these assumptions there exists a capital asset pricing model consisting of a capital market line (CML) and a security market line (SML). The CML helps in determining, the relationship between expected return and risk of portfolios of securities.Thus, it indicates the appropriate measure of risk for a portfolio. The SML helps in finding out the relationship between expected return and risk for individual securities as well as portfolios. The SML also tells about the appropriate measure of risk for securities.

2.5.4 Lending and Borrowing

The capital market line (CML) is usually constructed on the assumption that there is a risk free asset available for investment. It is further assumed that investors can borrow or lend as much as desired at the risk free rate. Let us also specify that lending is considered as investing in a risk free asset whereas borrowing is understood short selling.

Given the opportunity, investors can mix risk free assets with a portfolio of risky assets, 'm' to obtain the desired risk-return combination. Let 'Wf' represent the proportion invested in the risk free assets and 'I-Wf represent the proportion invested in the risky asset. Thus, the expected return on the portfolio can be computed as follows :

$$E(rp) = rWf + rM(1-Wf)$$

Wherem

E (rp) = Expected return from the portfolio

rm = Rate of return of the risky asset

Let us take some hypothetical data and use the above formula to compute expected returns associated with three investors options.

(i) Mixing lending with risky assets.

(ii) Investing only in the risky assets.

(iii) Mixing borrowing with risky assets.

Table I

Different Combination of borrowing and lending and the associated Risk and Return :

RETURN				
Proportion in risk-free asset (wf)	Risk Free return (rf%)	Proportion Risky asset (1-Wf)	Risky return (rm%)	Portfolio return (rp%)
0.5	5	0.5	10	7.5
0	5	1.0	10	10.0
-0.5	5	1.5	10	12.5
				1.5×10-0.5×5
				=15-2.5=12.5

RISK		
$\alpha p = \alpha m (1 - Wf)$ where $\alpha m = 20\%$		
	Proportion in Risky asset (1-Wf)	Portfolio risk (σp^2)
	0.5	10
	1.0	20
	-1.5	30

RISK - RETURN TRADE OFF				
Portfolio return (rp%)	Risk Free Return ($rf^{\%}$)	Risk Premium ($rp-rf^{\%}$)	Portfolio risk (σp^2)	Factpr of Proportionality ($rp-r^1$) αp
7.5	5.0	2.5	10	0.25
10.0	5.0	5.0	20	0.25
12.5	5.0	7.5	30	0.25

We have assumed that the investor invests half of his funds to the riskfree asset (lending at-0.5) and the other half to the risky asset. The borrowing example assumes that the investor borrows (Negative lending of wf-0.5) at the risk free rate and invests

one-half again in the risky assets. The intermediate case assumes exclusive investment (wf-0) in risky assets.

It can be observed that lending offers the lowest return whereas borrowing provides highest returns. An exclusive investment in the risky asset offers an in between return. It is a matter of common observation that when one invests in risk free and risky assets, the total risk of the portfolio is less than that of the risky asset alone.On the other hand, when one borrows to buy additional risky assets,the total risk of the portfolio increases over the risky asset alone.The later situation is referred can be computed as follows :

The variance of this portfolio can be computed as follows :

$$\sigma_p^2 = \sigma_f^2 w_f^2 + \sigma_m^2 (1 - Wf)^2 + 2 Cov_{fm} w_f (1 - w_f)$$

obviously,the first and third terms of the above equation would be zero as of = 0.

Thus,

$$\sigma p^2 = \sigma m^2 (1 - w_f)^2$$

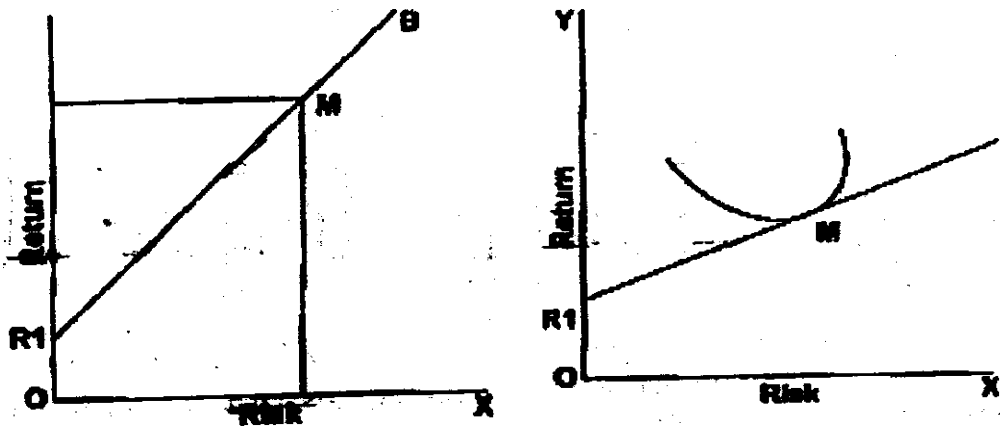
or $$\sigma p = \sigma m (1 - w_f)$$

In our example, it can be seen that the risk associated with the borrowing alternative is the greatest and it is lowest for the lending alternative. Investing exclusively in risky assets provided intermediate risk.

The risk premiums are proportional to risk. The factor of proportionality can be observed to remain constant, indicating that one unit of risk premium is accompanied by four units of risk.

2.5.5 The Capital Market Line (CML) :

Incorporation of the possibility of lending and borrowing would make the Markowitz's efficient frontier look like a straight line (R_iMB) as shown in the figure.



The line RMB rises from the return RF on the vertical axis and is tangent to the efficient frontier at point M.It reveals all the alternative combinations of the risky portfolios M with riskfree borrowing and lending be observed that the portfolio M has the property of maximizing the angle formed when a straight line in drawn from point R_1 to any point on the curve. It is, thus,the only portfolio which yields to maximum return per unit of risk.The line segment RMB contains the mixed portfolios of risky securities and risk free securities.The other part to the line segment (MB)(represents all combinationsof levered portfolios.

As mentioned earlier, the CAPM assumed that all investors have similar expectations. As such, the risk-return diagram would be the same for each one of them and all of them will wish to construct a portfolio comprising of the risk free asset and portfolio M. Since all investor possess the same risk portfolio,therefore in equilibrium it will contain all securities in proportion to their market value. If this were not true, prices would adjust until the value of the security becomes consistent with its proportion in portfolio M.This portfolio M, which comprises of all risky is known as the market portfolio.

It can be observed that portfolion rf MB dominate the ones which line on the curved line AMZ because they offer greater return for a given level of risk.

The investor can achieve any point onthe line rfMB by either comibining the risky asset (portfolioM) and the riskless asset (rf) is known as the capital market line (CML).

Thus,the line R_1 MB, which is formed by the action of all investors mixing the market portfolio (portfolio M) and the riskless asset (rf) is known as the capital market line (CML).

The CML can also be expressed with respect to the risk-free rate and return. On the market portfolio thus,

$$E(r_f) = r_t + \frac{E(r^m) - r^t}{\sigma m} X\sigma$$

The equation simply states that for any portfolio lying on the CML,the expected rate of return in excess of the risk free rate is proportional to the portfolio's standard deviation (Erm - rf/m)is the slope of the CML and indicates the "price of risk".Thus, the "price of risk"is the additional expected return for each additional unit or risk, simply stated,it is the reward per unit of risk.

2.5.6 The Security Market Line (SML)

The CML,explained in the earlier section indicates the appropriate measure of risk and the relationship between risk and return for efficient portfolios.However, it does not show the risk-return relationship for other portfolio and individual securities.This is so because these portfolios and securities are inefficient because they lie below the CML. As such the standard deviationof return is not an adequate indication of

risk for individual securities and inefficient portfolios.It follows that there is a component of risk in the totalthat is not necessary because if canbe diversified and thus will not be rewarded by the market. The other one is undiversifiable risk which is recognised by the market.

Let us assume that the market portfolio (portfolio M) is the only portfolio preferred by the investors.Thus,for an individual security the measure of risk that is of relevance is the additional risk that a security adds to the risk of the market portfolio.The marginal contribution of an individual security to the market portfolio is, therefore, the convariance of the security's returns with the return on the market portfolio. Thus, for any security, 'i' the risk would be covim and the systematic risk of the security would be simply covim/ m.

Using the above measure of risk,the expected return from security 'I' E (ri) must fulfill the following equation :

$$E(r^{t}) = r^{t} + \frac{E(r_m) - r^{t}}{\sigma m} \cdot \frac{Cov_m}{\sigma m}$$

The above equation shows that the inefficient portfolios lying below the CML rewards only the systematic component of the total risk. The specific risk in independent of fluctuations in market returns and thus can be diversified.Since investors can eliminate this risk and still maintain the return constant, the market shall not reward such risk.

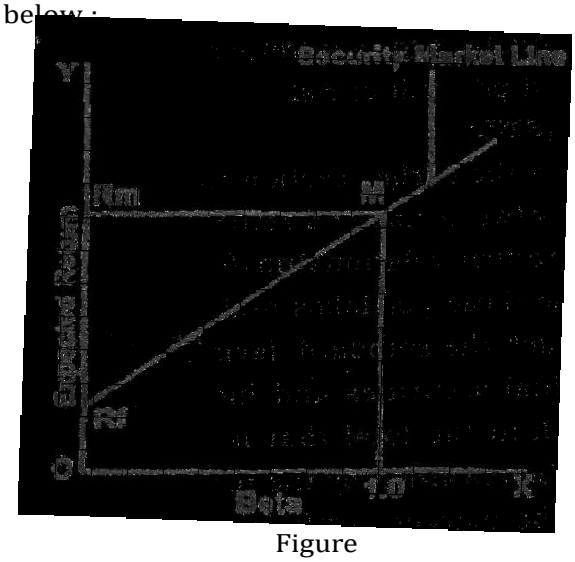
Therefore, according to the CAPM, higher return will be only associated with higher non-diversifiable (Systematic) risk. The previous equation can be written as

$$E(ri) = rf + \frac{Covm}{\sigma^2 m} E(r^m) + r^t$$

Covariation isnothing but beta itself

Therefore, E (r^t) = r^6 X B^t [E(rm-rf)]

The equation of the SML, when plotted in the graph would form a straight line as shown in the figure below :



Figure

The Y-axis measures the expected whereas the X-axis measures beta (instead of standard deviation) as a measure of risk.The SML is determined by the reutrn on the risk free asset which has a beta of zero, by definition,and the expected return on the market which has beta of one also by definition. In equilibrium, all securities, irrespective of their efficiency,will line on the SML.

It follows that the SML is a direct and convenient way of determining the expected return on a security. Each beta level represents a class of risk associated with the appropriate return for that class.

2.5.7 Application of Capital Asset-Pricing Model

The applications of the capital asset pricing model (CAPM) are described in the following paragraph :

1. Security Classification :

The security market line (SML) of the model can be used for classifying the securities into various risk categories.The securities with the beta of more than one can be classified as aggressive whereas the securities with a beta of less than one can beclassified as defensive.The returns likely to be earned by aggressive securities would be above average while defensive securities wouldprobably earn below average returns.

2. Security Valuation :

The SML can also be used for evaluatingthe relative lucrativeness of securities. Generally speaking, high risk securities are expected to offer high returns. It is important to know whether they are offering returns more or less than proportional to their risk.The same would be true of low risksecurities.

3. The Zero-Beta CAPM Model :

It is generally not possible for the investors to borrow and lend at the same rate. Financial intermediatries usually charge a higher rate on their loans than the rate at which they borrow. This is so because they have to provide for a margin of profit and also compensate for the credit risk of the borrower.Further in a inflationary environment, there is no such thing as a riskless investment because of all assets are subject to purchasing power risk which increases with a rise in inflation rate. Black' realised this problem and based on empirical evidence, he made certain amendments to the CAPM to make it more realistically applicable.He pointed out that a "Zero beta asset or portfolio could be substituted for the riskless asset.A zero beta portfolio is designed in a manner so that its return has not correlation with the market."

If we take 'rf as the zero-beta factor in place of rf, we will have the following equation :

---

1. Fisher,Blck, "Capital Market Equilibrium with Restricted Borrowing" Journal of Business, Vol. 45, No. 3 July, 1972.

$E(r^f) - Er(r^x) + B_i [E(r^m) - E(r_x)]$

4. The tax Adjusted CAPM and the yield-tilt Strategy :

The CAPM which has been discussed so far has not considered the presence of taxes, however, are a real fact of life. They assume further significance in security princing because capital gain space are taxes at a lower than the dividends. As such the investors belonging to different tax status hold different portfolio even when they anticipate the pre tax returns from them to be similar.

The impact of differential taxation rates on capital gains and dividend income on the Prices of Capital assets was taken up for study of Michael Brennans Apart from the regular assumptions of the CAPM, he assumed that dividend yields are certain. He gave the following formula for calculating the return on any portfolios after incorporating the effect of differential taxes.

$E(rt) = rt(I-T) + B^i (E\ r^m) -* rt - T(D^m - r^2) + TDi$

Where,

$$T = \frac{T_d - T_a}{1 - T_a}$$

T_d = Average tax rate on dividends in the economy.

T_a = Average tax rate on capital gains in the economy

d_m = Dividend yield on market portfolio

D_i = Dividend yield on the stock

It can be observed that if the rates of tax on dividend income and capital gains were equal, then T = 0 and the above equation would be reduced to the simple CAPM equation.

In case, the rate of tax is higher on dividend income, It would be positive and the expected, pre tax return would be an increasing function of dividend yield.

Since a tax adjusted CAPM will effect the portfolio preferences of investors, inspite of holding widely diversified portfolios, the Investor will be titled more in favour of those securities which will offer them a comparative advantage.Investors in low tax slabs would perhaps tilt their portfolios towards high yield securities. Since they would have a lesser tax-disadvantage from such securities and vice-versa.

However,such a strategy would have its own cost in terms of additional non-market (residual) risk that a tilted portfolio may enjoy as compared to a diversified portfolio across all yield levels. The investor would thus, need to analyse whether the potential additional return fro the tilt strategy is worth incurring the additional residual risk.

---

1. Beman.Michael, "Taxes Market Valuation and Corporate Financial Policy, National Tax Journal,Vol. 25, 1970.

2.5.8 Tests and Capital Asset Princing mode

The Capital asset pricing model is a pain stakingly derived equailibrium model that has certain intuitive appeal. However, it is a simplification of reality. So, it may be sufficiently abstract to be inappropriate for practical applications. Many research attempts have been made to assess as to how well they describe the actual behaviour of security market prices and also to find out as to how well thus underlying assumptions thin to reality.

There have been numerous tests of security market line relationship. Complete reporting of these however, lies outside the scope of our discussion. Rather we shall focus on the major results of the analysis made by the researchers.

Research attempts of CAMP have been made in order to find out whether security returns are as directly associated with beta, as contended by the theory. It has been indicated by the performance of professionally managed funds and the beta measure that returns on portfolio very positively with beta in an almost linear fashion.In the long run, portfolios with a high beta have provided larger total returns than the low- risk ones.Many empirical results around the world have confirmed that risk and returns are positively related to each ohter over a long period of time.

However,the beta measure does not explain the short run risk-return relationship as efficaciously as the long run.

The capital asset pricing model states that

Return = Risk free rate + Beta (Market Return - Risk free rate)

Therefore, a security having a zero beta must give a return that would be equal to the risk free rate. However,the empirical results do not conform exactly to this propositions.

The major research results are dealt with in the following paragraphs :

1. It has been observed that returns on-a-zero beta portfolio exceed the risk free rate. It means that the market values something more than only the beta measure. It must be some unsystematic risk which makes the return higher for the zero beta portfolio.
2. It can be seen from the above figure that the zero beta model is a beta explanation of the risk return relationship than the pure version of the SML.The actual risk return relationship appears to be flatter than that asserted by the CAPM.This implies that the low beta securities earn higher returns and higher risk securities earn lower returns than predicted by the theory.
3. The theory and evidence on CAPM come to cross roads,especially in the short run. Certain research studies have shown that over a short period of time, risk and return are found to be negatively related,i.e. that in a bullish period, the lower beta securities can go up more than the more volatile securities and vice-versa.

4. Since the CAPM considers all securities, it does not take into account other financial instruments as well asthe non-marketable assets, for example, an individuals's investments in education.Therefore, the stock market index would be an imperfect measure of market movements. And when an imperfect measure of market risk is used, it is very much possible to arrive at an imperfect level of market sensitivity.

2.5.9 Summary

In this chapter we saw how capital market theory establishes a linear relationship between the expected return and total risk on all efficient portfolios.The straight line so forms includes portfolios composed of different percentages of risk free asset and market portfolio. The lesson describes in length the concept of CML and SML with the help of examples. It also highlights their inter-relationship with CAPM. The lesson discusses the applications of CAPM. Tax adjusted CAPM has also been discussed in detail.

2.5.10 Self Check Exercise

1. Explain CAPM
2. What are the application of CAPM

2.5.11 Review Questions :

1. Explain how the existence of unlimited borrowing and lending opportunities allow one to change the form of the efficient frontier.
2. Write a note on the applications and tests of the CAPM.

Short Question

1. What is capital market line
2. Explain security market line
3. Briefly explain the application and test of CAPM.

2.5.12 Key Words

CAPM : Using beta as the measure of non diversifiable risk, the capital asset pricing model (CAPM) defines the required return on a security according to the equation

$R_p = R_f + B_p (R_m - R_f)$

R = return,f = risk free security, m = market

CML : Capital market line consists of all efficient portfolios by induction of borrowing & lending.

SML : When CAPM is plotted graphically, it is called security market line. It tells the requiredreturn an investor should earn in the market place for any level of beta.

2.5.13 Suggested Readings

1. Investment Analysis and Portfolio management -Prasanna Chandra-TMH-2nd Edition, 2005.
2. Investment-Zvi Bodie, & Mohanty-TMH-6th Edition, 2007.
3. Investment Management-VK Bhalla (S.Chand & Co.), 2009.
4. Investment Analysis & Portfolio Management-Reilly-8/e-Thomson/Cengage learning.
5. Security Analysis & Portfolio Management-Fisher and Jordan, 6/e Pearson/PHI, 2009.
6. Alexander, Sharpe, Bailley-Fundamentals of Investment-Pearson/PHI, 2009.
7. Portfolio Management-Barua, Verma and Raghunathan (TMH), 1/e, 2006.
8. Reilly & Brown-Investment Analysis & Portfolio Mgmt.-Thomson Learning, 7/e, 2007.

9. Ranganathan & Madhumathi-Investment Analysis & Portfokio Mgmt.-Pearson, PHI.
10. Punithavathy Pandian - Security Analysis & Portfolio Mgmt.- Vikas Publications, 2009.
11. Practical Investment Arrangement-Strong-Thomson/Cengage Learning 3/e.
12. Fischer Donald E., Jordan Ronald J. Security Analysis and Portfolio Management, Prentice hall of India, New Delhi.
13. V.A. Avadhani, Investment Management, Himalaya Publishing House, Mumbai, 2003.

Lesson No. 2.6 Author : Dr. Patwant Kaur

Portfolio Selection & Revision

2.6.1 Objective

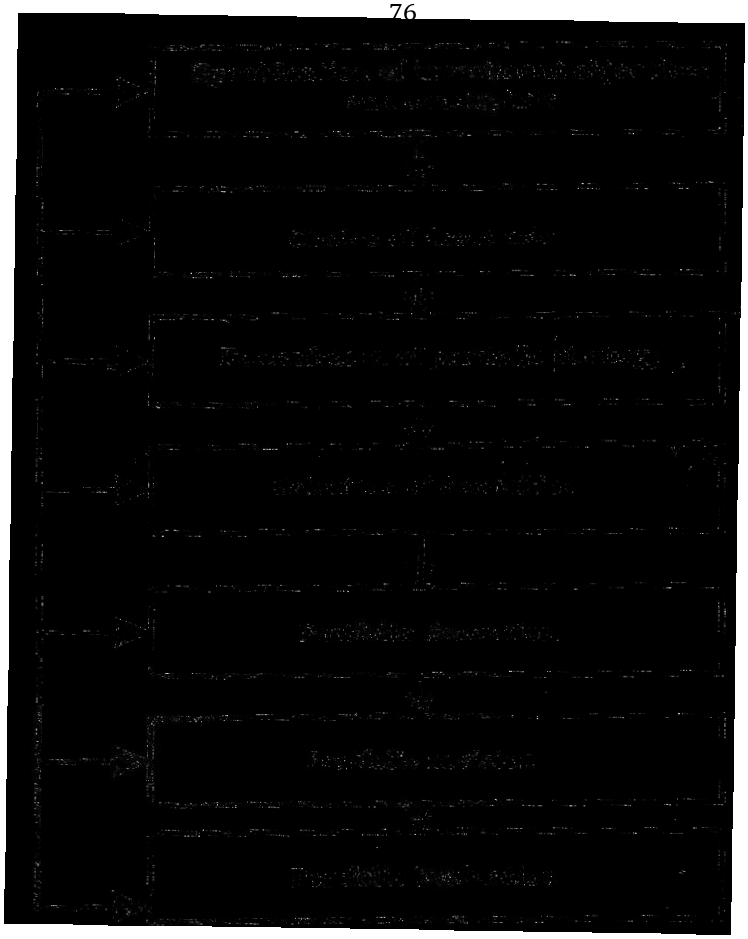
The chapter put emphasis selection and position of a portfolio. The chapter focuses on Investment objective specification and constraints choice of asset mix, selection of securities and executing portfolio, following it performance revolution.

2.6.2 Introduction

Investment management, also referred to as portfolio management, is a complex process or activity that may be divided into seven broad phases :

I. Specification of investment objectives and constraints.
II. Choice of asset mix
III. Formulation of portfolio strategy.
IV. Selection of securities.
V. Portfolio execution
VI. Portfolio Rebalancing or revision
VII. Performance evaluation.

For pedagogic convenience these phases are treated sequentially. However, it must be emphasized that they are interrelated as shown in Exhibit given below :



2.6.3 Specification of investment objectives and constraints.

The first step in the portfolio management process is to specify one's investment objectives and constraints. The commonly stated investment goals are:

(a) Income ■ To provide a steady stream of income through regular interest/ dividend payment.

(b) Growth ■ To increase the value of the investment amount through capital appreciation and growth in current income.

(c) Stability ■ To protect the principal amount invested from the risk of loss.

Since income and growth represent two ways by which return is generated and stability implies containment or even elimination of risk, investment objectives may be expressed more succinctly in terms of return and risk. As an investor, you would primarily be interested in a higher return (in the form of income and/ or capital appreciation) and a lower level of risk. However, return and risk typically go hand-in-hand. So you have to ordinarily bear a higher level of risk in order to earn a higher return. How much risk you would be willing to bear to seek a higher

return, depends on your risk disposition. Your investment objective should state your preference for return relative to your distaste for risk.

2.6.4 Risk Return Trade Off ■

Your risk-return trade off can be expressed in the form of an indifference curves (or utility curves) as given below :

Diagram A

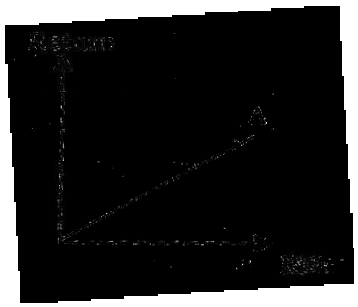


Diagram B

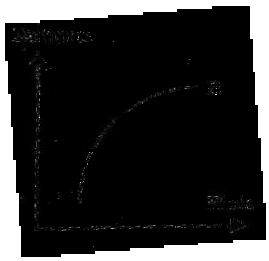
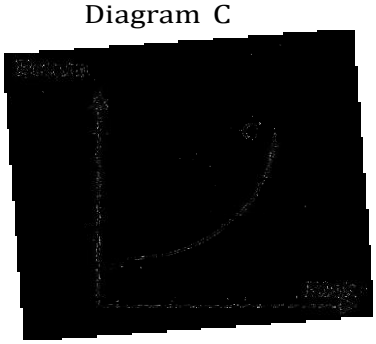


Diagram C



These indifference curves show three broad types of utility curves. The linear indifference curve, depicted in diagram a, represents the risk-return tradeoff of on investor who is willing to bear additional risk if there is a equal proportional increase in return. The concave indifference curve, shown in diagram B, describes the preferences of a Risk-lover. He is willing to assume disproportionately higher amounts of risk for earning additional returns. Finally, the convex indifference curve, shown in diagram C, reflects the preferences of an investor who requires disproportionately higher returns for bearing additional risk. An investor generally have a diminishing marginal utility for wealth, their risk-return tradeoff is represented by a convex utility curve.

2.6.5 Operational Statement of Investment Objectives

Theoretically, you are expected to maximise your utility level, which is a function of risk and return. So you are supposed to :

(a) specify your utility indifference curves; and

(b) strive to achieve the highest attainable utility level.

In practice, however, there are problems in developing utility indifference curves. Given this practical difficulty, you would do well to specify your investment objectives in one of the following ways.

1. Maximise the expected rate of return, subject to the risk exposure being held within a certain limit (the risk tolerance level).
2. Minimise the risk exposure, without sacrificing a certain expected rate of return (the target rate of return). Which of these two should your adopt?

We should start by defining how much risk you can bear or how much you can afford to lose, rather than specifying how much money you want to make. The risk you can bear depends on two key factors (a) your financial situation; and (b) your temperament. To assess your financial situation answer the following questions : What is the position of year wealth? What major expenses (house construction, marrige, education, medical treatment, etc.) can be anticipated in the near future? What is your earning capacity? How much money can you lose without seriously hurting your standard of living? A careful and realistic appraisal of your assets, expenses, and earnings is basic to defining your risk tolerance.

After appraising your financial situation, assess your temperamental tolerance for risk. Even though your financial situation may permit you to absorb losses easily, you may become extremely upset over small losses. On the other hand, despite a not-so-strong financial position, you may not be easily ruffled by losses. Understand your financial temperament as objectively as you can.

Your risk tolerance level is set by either your financial sitution on your fiancial temperament whichever is lower. Of course, you must realise that your risk tolerance cannot be or should not be defined too precisely and rigorously. For practical purposes, it suffices if you define it as low, medium or high. Once you have articulated your risk tolerance realistically in this fashion, it will serve as a valuable guide in your investment selection. It will provide you with a useful perspective and prevent you form being a victim of the waves and manias that tend to sweep the market from time to time.

Constraints →

In pursuing your investment objective, which is specified in terms of return requirement and risk tolerance, you should bear in mind constraints arising out of or relating to the following factors :

Liquidity →

What are your liquidity needs in the foreseeable future that need to be reflected in designing your portfolio?

Taxes→

Given your tax situation, what kinds of tax shelter, if any, should you seek?

Time horizon →

What time horizon is appropriate for your portfolio? 1 year, 5year, 10 years, or any other?

Unique preferences and circumstances →

Are there some unique preferences and circumstances which should have a bearing on your portfolio decisions?

2.6.6 Selection of Asset Mix

In your scheme of investments, you must accord top priority to a residential house and a suitable insurance cover. In addition, you must maintain a comfortable liquid balance in a convenient form to meet expected and unexpected expenses in the short run. Once these are adequately provided for, your asset mix decision is concerned mainly with financial assets which may be divided into two broad categories, viz. stocks and bonds.

Stocks →

It includes equity shares (which in turn may be classifiwed into income shares, growth shares, bluechip shares, cyclical shares, speculative shares, and so on and units/ shares of equity-oriented schemes of mutual funds (like Master shares, Birla Advantage, and so on. 'Bonds', defined very broadly, consist of non-convertible debentures of private sector companies, public sector bonds, gilt-edged securities, RBI relief Bonds, units/ shares of debt-oriented schemes of mutual funds, National Saving Certificate, Indira Vikas Patras, Bank Deposits, Post Office savings deposits, fixed deposits with companies, deposits in provident fund and public provident fund schemes, deposits in the National Savings Scheme, and so on. The basic characteristic of these investment in that they earn a fixed or near fixed return. Should the long-term stock-bond mix be 50:50 tp 75:25 or 25 : 75 or any other? Referred to as the strategic asset-mix decision (or policy asset-mix decision) this is by for the most important decision made by the investor. Emperical studies have shown that nearly 90% of the variance of the portfolio return is explained by its asset mix. Put differently, only about 10% of the variance of th e portflio return is explained by other elements like 'sector' rotation and security selection'. Given the significance of the asset-mix decision, you should hammer it out carefully.

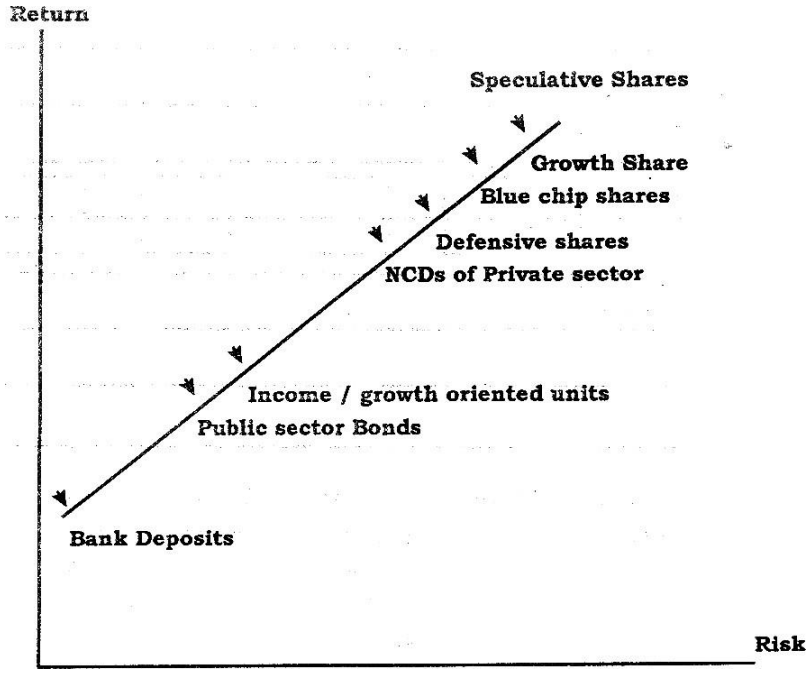
Conventional Wisdom on Asset Mix →

The conventional wisdom on the asset mix is embodied in two propositions :

1. Other things being equal, an investor with greater tolerance for risk should tilt, the portfolio in favour of stocks, whereas an investor with lesser tolerance for risk should tilt the portfolio in favour of bonds. This is because in general stocks are riskier than bonds hence earn higher returns than bonds

following exhibit portrays the risk-return relationship for various types of stock and bonds investments.

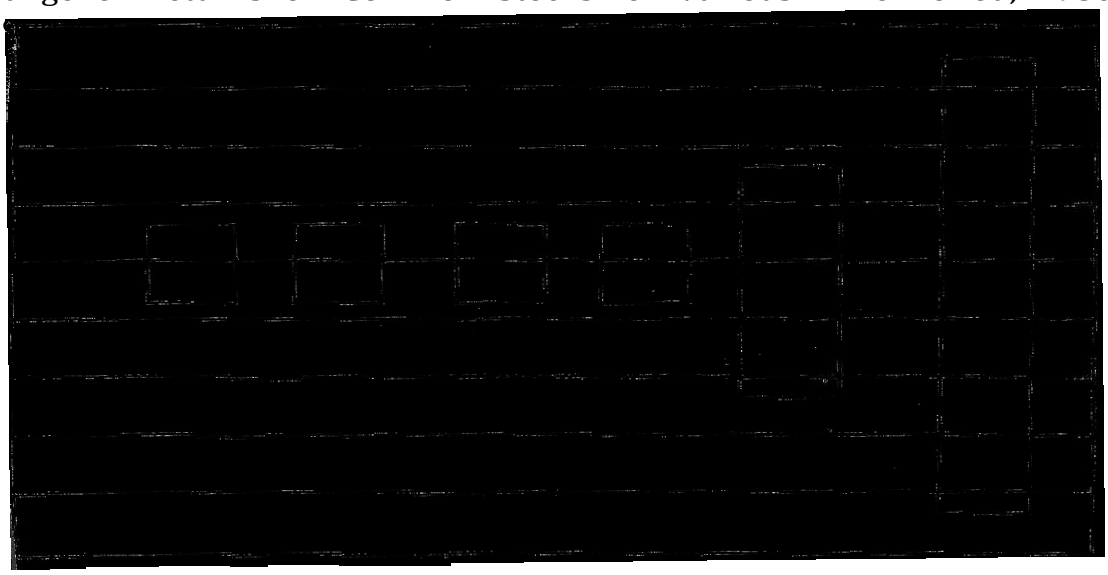
Risk return relationship for various types of Bonds and Stocks



James H. Lorie summed up the long view well when he stated", The most enduring relation in all finance perhaps is the relationship between returns on equities (or stocks) and returns on bonds. In all periods of American History British history, French history and German history, equities (stocks) have provided higher returns than bonds." A similar observation can be made when we look at the returns on stocks and bonds in India for the last time two decades.

2. Other things being equal, an investor with a longer investmet horizontal should tilt his portfolio in favour of stocks whereas an investor with a shorter investments horizon should tilt his portfolio in favour of bonds. This is because while the expected return from stocks is not very sensitive to the length of the investment period, the risk from stocks diminishes as the investment period lengthens. This proposition is illustrated in following exhibit. Which shows the average return and range of return from stocks for various investment period over the period 1950-1980 in the U.S capital market.

Range of Returns on Common Stocks for Various Time Period, 1950-1



	1-year Periods	5-year Periods	10-year Periods	15-year Periods	20-year Periods	25-year Periods
High	+52.6%	+23.9%	+19.3%	+16.47%	+13.4%	+10.3%
Average	+13.0%	+10.4%	+9.5%	+9.3%	+9.4%	+9.4%
Low	26.6%	2.4%	+1.2%	+4.3%	+6.5%	+8.4%

Source : Vanguard Group

One can reasonably expect a similar pattern in other capital markets as well. Why does the risk of stocks diminish as the investment period longthens? As the investment period longthens, the average yearly return over the priod is subject to lesser volatility because low returns in some years may be offset by high returns in other year and vice versa. Put differently there is the benefit of time diversification' whcih is distinct from 'portfolio diversification'. As Mark Kritzman say : "Since investors cannot know which period is the best period, they invest through many periods Hence they are more comfortable investing in risky assets over the long run than over the short run."

The implications of the above proposition are captured in following Exhibit which shows how the appropriate percentage allocation to the stock component of the portfolio is influenced by the two basic factors viz. risk tolerance and investment horizon (A popular rule of thumb for asset allocation says that the percentage allocation to debt must be equal to the age of the individual).

Appropriate percentage Allocation to the Stock Component of the Portfoliod →

	Risk Tolerance		
Time Horizon	Low	Moderate	High
Short	0	25	50
Medium	25	50	75
Long	50	75	100

To obtain the corresponding percentage allocation for the bond component of the portfolio, simply substract the number given inthe exhibit from 100. You will find this matrix helpful in resolving your asset mix decision. (Of course, before using this matrix, you would define your risk tolerance and investment horizon as realistically as possible). In applying this matrix, the zero percent given for the low risk tolerance/ short time horizon, may be raised to 10 percent or so. In a similar manner, the 100 percent, given for the cell high risk tolerance/ long time horizon, may be lowered to 90 percent. These modifications will help the investor in realising the benefit of diversification across stocks and bonds.

For the sake of simplicity, we assumed that there is a single investment horizon. In reality, an investor may have multile investment horizons corresponding to varied needs. For example, the investment horizons corresponding to various goals sought by an investor may be as follows :

Investment Goal	Investment Horizon
Buying a car	Two years
Constructing a house	Ten Years
Achieving financial independence	Twenty Years
Establishing a charitable institution	Thirty Years

The Fallacy of Time Diversification →

Paul Samuelson and others have argued that the notion of time diversification is fallacious. Even though the uncertainty about the average rate of return diminishes over a long time period, it also compounds over a longer time perod. Unfortunately the latter effect dominates. hence the total return becomes more uncertain as the investment horizon lengthens.

An example will illustrate this print. Suppose the expected one year return on a stock is 15 percent wth a standard deviation of 30%. If you hold the stock for 5 years, the expected annual return over 5 years remains at 15%, but the standard deviation of the average return over 5 years declines from 30% to 13.42% ($30\sqrt{5}$). Even though the standard deviation of the 5 years return is now significantly

lower at 0.1342 (or 13.42%), a disappointment of one standard deviation will affect the terminal wealth by a factor of (1-0.1342) 5=0.487. This certainly has a larger impact than a swing of 30% in one year. As Bodie et all. Put it: "While the confidence band around the expected rate of return narrows with investment life, the dollar confidence band widens."

The above result has an important implication although an investor is less likely to lose money over a longer horizon as compared to a shorter horizon, the magnitude of his potential loss clearly increases with the length of his investment horizon. Hence the critics of time diversification argue that if you prefer a risk less investment over a shorter investment horizon, you should prefer a riskless investment for over a longer investment horizon as well. Put differently, your risk exposure should not depend on your investment horizon.

Resurrection of Time Diversification →

Although the above critique of time diversification is mathematically correct, all is not lost for those who believe in the principle of time diversification. There remain some valid reasons why you should still condition your risk posture on your investment horizon. Two of them deserve a particular mention.

1. There is some evidence that stock returns are not serially independent but tend to mean-revert over long intervals. This means that it is more likely that a below average return may be followed by an above average return than another below average return. Given this tendency of stock returns to mean-revert, the dispersion of terminal wealth increases at a slower return than what is implied by serially independent returns. (Remember that the critics of time diversification assume a perfectly efficient market in which stock returns are serially independent).
2. You may be inclined to accept more risk over a longer horizon as you have greater scope to adjust your consumption and work habits. As Mark Kritzman put it, "If a risky investment performs poorly at the beginning of a short horizon, there is little you can do to compensate for loss of wealth. Over a long horizon, however, yu can postpone consumption, and work harders to achieve your financial goals."

2.6.7 Formulation of Portfolio Strategy →

After you have chosen a certain asset mix, you have to formulate an appropriate portfolio strategy. Two broad choices are available in this respect, an active portfolio strategy or a passive portfolio strategy.

Active Portfolio Strategy →

This involves departing from the normal (or strategy or long run) asset mix to reflect one's assessment of the prospects of various assets in the near future. Suppose your investible resources for financial assets are 100 and your nromal (or strategic) stock bond mix is 50:50. In the short and intermediate run however you may be inclined to deviate from your long term asset mix. If you expect stocks to

out proform bonds, on a risk adjusted basis, in the near future, you may perhaps step up the stock component of your portfolio to say 60 to 70 percent. Such an action, of course, would raise the beta of your portfolio. On the other hand, if you expect bonds to out perform stocks, on a risk-adjusted basis in the near future, you may step up the bond component of your portfolio to 60% or 70%. This will naturally lower the beta of your portfolio.

Market timing is based on an explicit or implicit forecast of general market movements. The advocates of market timing employ a variety of tools like business cycle analysis, moving average analysis, advance-decline analysis, and econometric models. The forecast of the gneral market movement derived with the help of one or more of these tools is tempered by the subjective judgement of the investors. Often, of course, the investor may go largely by his market sense.

Anyone who reviews the fluctuations in the market may be tempted to play the game of market timing yet very few seem to succeed in this game. A careful study on market timing argues that an investment manager must forecast the market correctly 75% of the time just to break-even, after taking into account the costs of errors and the costs of transactions. As Fischer Black said : "The market does just as well, on average, when the investor is out of the market as it does when he is in. So he loses money relative to a simple buy and hold strategy, by being out of the market part of the time". Echoing a similar view John Bogle, Chairman of the Vanguard Group of investment companeis said: "In 30 years in this business, I don not know anyone who has done it successfully and consistently, nor anybody who knows anybody who has done it successfuly and consistently. Indeed, my impression is that trying to do market timing is likely to be counter productive." John Maynard Keynes rendered a similar verdict decades ago." We have no proved able to take much advantage of a general systematic movement out of and into ordinary shares as a whole at difeerent phases of the trade cycle. As a result of these experiences. I am clear that the idea of wholesale shifts is for various reasons impracticable and indeed undesirable."

Sector Rotation →

The concept of sector rotation can be applied to stocks as well as bonds. It is, however, used more commonly with respect to the stock component of the portfolio where it essentially involves shifting the weightings for various industrial sectors based on their assessed outlook. For example, if you believe that comment and pharmaceutial sectors would do well compared to other sectors in the forth coming period (one year, two year, or whatever), you may over weight these sectors, relative to their position in the market portfolio. Put differently, your stock portfolio will be tilted more towrds these sectors in comparison to the market portfolio.

With respect to the bonds, sector rotation implies a shift in the composition of the bond portfolio in terms of quality (as reflected in credit rating), coupon rate, term to maturity, and so on. For example, if you anticipate a rise in interest rates you may shift from long term bonds to medium term or even short-term bonds. Remember that long term bond is more sensitive to interest rate variation compared to a short term bond.

2.6.8 Security Selection →

Perhaps the most commonly used vector by those who follows an active portfolio strategy, security selection involves a search for under priced securities. If you resort to active stock selection, you may employ fundamental and/ or techncial analysis to identify stocks which seem to promise superior returns and concentrate the stock component of your portfolio on them. Put differently, in your portfolio such sticks will be over weighted relative to their position in the market portfolio. Likewise, stocks which are perceived to be un attractive will be under weighted relative to their position in the market portfolio.

As for as bonds are concerned, security selection calls for choosing bonds which ofter the highest yield to maturity at a given level of risk.

Use of a Specialized Investment Concept →

A fourth possible approach to achieve superior returns is to emply a specialised concept or philosophy, particularly with respect to investment in stocks. As CharlesD. Ellis put it, a possible way to enhance returns" is to develop a profound and valid insight into the forces that drive a particular sector of the market or a particular group of companies or industries and systematically exploit that investment insight or concept." (Charles D. Elis, Investment Policy : How to win Loser's Game, Dow Jones-Irwin Homewood, Illinios, P. 15.) Some of the concepts that have been exploited successfuly by investment practioners are :

Growth stocks
Neglected or 'out of favour' stocks
Asset-rich stocks
Technology stocks
Cyclical stocks

The advantage of cultivating a specialized investment concept or philosophy is that it wll help you to :

(a) focus your efforts on a certain kind of investment that reflect your abilities and talents, (b) avoid the distractions or pursuing other alternatives, and (c) master an approach or style through sustained practice and continual self critique.

As against these merits, the great disadvantage of focusing exclusively on a specialised concept or philosophy is that it may become obsolete. The changes in market place may cast a shadow over the validity of the basic promise underlying

the investment philosophy. Given you profound conviction and long term commitment to your specialised investment concept or philosophy, you may not detect the need for change till it becomes rather late.

Passive Strategy →

The active strategy is based on the promise that the capital market is characterised by inefficiencies which can be exploited by resorting to market timing or sector rotation or security selection or use a specialised concept or some combination of these vectors. The passive strategy on the other hand, rests on the tanet that the capital market is fairly efficient with respect to the available information. Hence, the search for superior returns through an active strategy is considered futile.

Operationally, how is the passive, strategy implemented ? Basically, it involves adhering to the following two guidelines.

(a) Create a well diversified portfolio at a pre determined level of risk.

(b) Hold the portfolio relatively unchanged over time, unless it becomes inadequately diversified or incosnsitent with the investor' s risk return preferences.

Portfolio Strategy Matrix →

Keith Ambachsteer has developed a matric shown in following exhibit, which pulls together the elements of timing and selectively. It can be a useful guide for developing your portfolio strategy. (Keith Ambachsteer." Portfolio theory and the Security Analyst.", Financial Analysis Journal, Nov-Dec 1972,P. 33)

Portfolio strategy Matrix

Ability to Select Undervalued securities \ Ability to forecast Overall market	Good	Poor
Good	1. concentrate holding in selected undervalued securities rather than diversify broadly. 2. Shift beta above and below the desired long term average based on market forecasts.	1. Concentrate holding in selected undervalued securities rather tahtn diversify broadly. 2. Keep beta stable at the desired long term average
Poor	1. Hold a broadly diversified list of securities. 2. Shift beta above and below desired long term average, based on market forecasts.	1. Hold a broadly diversified list of securities. 2. Keep beta stable at desired long term average.

Selection of Securities.

Selection of Bonds (Fixed Income Avenues)

You should carefully evaluate the following factors in selecting fixed income avenues.

1. Yield to maturity : The yield to maturity for a fixed income avenue represents the rate of return earned by the investor if he invests in the fixed income avenue and holds it till its maturity.
2. Risk of default : To assess the risk of default on a bond, you may book at the credit rating of the bond. If no credit rating is available, examine relevant financial ratios (like debt-to-equity ratio, lines interest ration, and earning power) of the firm and assess the general prospects of the industry to which the firm belongs.
3. Tax Shield : In yesteryears, several fixed income avenues offered tax shield; now very few do so,
4. Liquidity : If the fixed income avenue can be converted wholly or substantially into cash at a fairly short notice, it possesses liquidity of a higher order.

Selection of Stock (Equity Shares)

Three broad approaches are employed for the selection of equity shares; technical analysis, fundamental analysis and random selection. Technical analysis looks at price behaviour and volume data to determine whether the stock will move up or down or remain trend less. Fundamental analysis focuses on fundamental factors like the earning level, growth prospects, and risk exposure to establish the intrinsic value of a share. The recommendation to buy, hold or sell is baed ona comparison of the intrinsic value and the prevailing market price. The random selection approach is based on the premise that the market is efficient and securities are properly priced.

Following exhibit shows the three approaches perform at different levels of market efficiency.

Levels of Market Efficiency and Approaches to Security Selection

Level of efficiency\Approaches	Technical analysis	Fundamental analysis	Random Selection
Inefficiency	Best	Poor	Poor
Weak-form efficiency	Poor	Best	Poor
Semi-strong-form efficiency	Poor	Good	Fair
Strong from efficiency	Poor	Fair	Best

2.6.9 Portfolio Execution

By the time this phase of portfolio managment is reached, several keys issues have been sorted out. Investment objectives and constraints have been specified, asset mix has been chosen, portfolio strategy has been developed, and specific securities to be included in the portfolio have been identified. The next step is to

implement the portfolio plan by buying and/ or selling specified securities in given amounts. This is the phase of portfolio execution which is often glossed over in portfolio management literature. However, it is an important practical step that has a significant bearing on investment results. Further, it is neither simple nor costless as in sometimes naively felt. For effectively handling portfolio execution phase, you should understand what the trading game is like, what is the nature of key players (transactors) in this game, who are the likely winners and losers in this game, and what guidlines should be borne in mind while trading. Trading Game

Security transactions tend to differ from normal business transactions in two fundamental ways.

1. A businessman entering into a transaction does so with a reasonable understanding of the motives of the party on the other side of the transaction. For example, when you are buying a piece of used machinery, you are well aware of the motives of the seller. In contract, in a typical securities transaction, the motive and even the identity, of the other party is not known.

2. While both parties generally gain from a business transaction, a security transaction tends to be a zero sum game. A security offers the same future cash flow stream to the buyer as well as the seller. So, apart from consideration of taxes and differential risk bearing abilities, thevalue of security is the same tothe buyer as well as the seller. Hence, constructive motives which guide business transactions are not present in most security transactions. This means that if a security transacion benefits one party, it hurts the other. Put differently, if one wins the other losses.

Motives for Trade →

People trade because they think they have superior information or better methods of analysing information. However, most traders tends to confuse noise or randomness for information As Meir Statman Says : "Traders see patterns in stock prices that are random, and they rely on intuitive judgement even when systematic analysis would have domonstrated that their judgement is incorrect.

Another motivation is emotional Trading can be a source of pride. As Meir Statman Says : "Specially people trade because trading brings with it the joy of pride. When someone decides to buy a stock the assumes responsibility for the decision. A stock that goes up brings not only profits, but also ride." Of course, if the trading decision turns out tobe wrong it can inflict losses and cause embarrassment.

Key Player →

Securities market appears to be thronged by four types of players or transactors : value based transactors, information-based transactors, liqudity-based

transactors, and pseudio-information based transactors. Generally, the dealer or the market maker intermediates between these transacters.

(A) Value Based Transactors →

A value based transactor carries out extensive analysis of publicly available information to establish value. He trades when the difference between the value assessed by him and the prevailing market price so warrants. Typically, he places limit orders to buy and sell with a spread that is large enough to provide a cuslion against errors of judgement and information lacumar. For example, a Value based Transactor who establishes an instrinsic value of Rs. 50 for some equity share may place an order to buy if the net price is Rs. 40 or less. Value Based Transactors generally serve as the anchor for trading system and establish the framework for the operations of dealers. Value Based Transactors typically dorit place much importance on time.

(B) Information Based Transactors →

An information based transactor (IBI hereafter) transacts on the basis on information which is not in public domain and, therefore, not reflected in security price, he is keen to transact soon. To him, time is a great value. While the VBI is concerned about how much the market will move towards the justified price (the price established by him based on fundamental analysis), the IBI is bothered about how soon the market price will move up or down in response to new information. The IBI generally employs "incrimental" fundamental analysis (as he is concerned about price analysis because timing is crucial to his operations. Unlike the VBI, he rarely tries to establish the absolute value of a security Instead, he tries to assess the likely impact of 'marginal' fundamental and technical development.

(C) Liquidity Based Transactors →

A liquidity based transactor (LBT hereafter) however, trades primarily due to liquidity considerations. He trades to deploy surplus funds or to obtain funds or to rebalance the portfolio. His trades are not based on a detailed valuation exercise (as is the case of a VBI) or access to some information that is not already reflected in market price (as is the case of an IBI). Hence, he may be regarded as an information less trader who is driven mainly by liquidity considerations.

(D) Pseudo-information Based Transactors →

A pseudo-infromation based transactor (PIBI, hereafter)believes that he possesses information that can be a source of gain, even though that information is already captured or impounded in the price of the security or, he exaggerates the values of new information that he may come across and forms unrealistic expectation. Essentially, the PIBT, like the LBT, is an information less trader. Yet, he mistakenly

believes that he possesses information which will generate investment advantage to him.

Dealers →

A dealer intermediates between buyers and sellers eager to transact. The dealer is ready to buy or sell with a spread which is fairly small for actively traded securities. For example, the bid and ask prices of a trader for a certain security may be 80.82. This means that the dealer is willing to buy at so and sell at 82. The dealer's quotations may move swiftly in response to changes in the demand and supply forces in the market. Typically, the dealers bid-ask price of the dealer is higher than the bid price of the VBT and the ask price of the dealer is lower than the ask price of the VT. The dealers functions is such that he is not required to take a view on whether a security is worth buying or worth selling. He acquires in accommodating a transaction. Hence, the dealer is a remarkable innocuous person. Lurking behind the dealer, of course, is the transactor's real trading adversary, whose identity and motive are often unknown.

Following exhibit summarises the trading motivations time horizons and time versus price preferences of different transactor.

Summary of Trading Motivation, Time Horizons, Time Vs Price Preference

Transactor	Motivation	Time Horizon	Time Vs Price Preferences
VBT	Discrepancy between value & Price	Weeks to months	Price
IBT	New information	Hours to days	Time
LBT	Release or absorbed cash	Hours to days	Time
PIBT	Apparently new information	Hours to days	Time
Dealer	Accommodation	Minutes to hours	Indifferent

Who Wins, Who Loses

Who wins and who loses inthe trading game which is essentially a zero sum game. It appears that the IBI's odds of winning are the highest, assuming that his information is substaintiated by the market. He is followed by the VBT, LBT, and PIBT in that order. Put differently, the above question may be answered as follows:

The IBT seems to have a distinct edge over others.

The VBT tends to lose against the IBT but gains against the LBT & PIBT.

The LBT may have some advantage over the PIBT.

2.6.10 Guidelines

The following guidelines must be borne in mind while executing transactions.
Maintain a dialogue with the broker when a trade is seriously contemplated, check with the broker about the sensitivity of the stock to buying or selling pressure, the volume that can be traded without pushing the price out of the desirable range, the manipulative games, if any, being played by operators, and the degree of market resilience. Place an order which serves your interest best-Different kinds of orders can be placed with your broker. The more common ones are; the market order, the best efforts order, the market-on open order, and the limit order. The market order instructs the broker to execute the transaction promptly at the best available price. This order leaves very little discretion to the broker. The best efforts order gives the broker a certain measure of discretion to execute the transaction when he considers market condition more favourable. The market on open order instructs the broker to execute the transaction no sooner the market opens. The limit order instructs the broker to execute the transaction only within the price limits specified in the order. The timing of the trade is left to the ebb and flow of market conditions. For the IBT the most appropriate order is the market order or the market on open order. For the VBT the most appropriate order is the limit order. And for the LBT and PIBT the most appropriate order may be the best efforts order.

Avoid serious trading errors The worst trading errors appear to be the following:

(a) a VBT sells time too cheaply.

(b) an IBT buys time too expensively, and

(c) an LBT by appearing motivated by information, evokes very defensive responses from dealers and other market participants. Guard yourself against these errors.

2.6.11 Portfolio Revision

Irrespective of how well you have constructed you portfolio, it soon tends to become inefficient and, hence needs to be monitored and revised periodically. As Robert D. Arnott says; “Portfolios donot manage themselves. Now can weather the ages unaltered. With each passing day, portfolios that we carefully crafted yesterday become very less than optimal change is the investors only constant.
Over time several things are likely to happen. The asset allocation in the portfolio may have drifted away from its target, the risk and return characteristics of various securities may have altered, finally, the objectives and preferences of the investor may have changed. Given the dynamic developments in the capital market and changes in your circumstances, you have to periodically monitor and revise your portfolio. This usually entails two things viz. portfolio rebalancing and portfolio upgrading.

2.6.12 Portfolio Rebalancing

It involves reviewing and revising the portfolio composition (i.e. the stock bond mix). There are three basic policies with respect to portfolio rebalancing : buy and hold

policy, constant mix policy, portfolio insurance policy.

Under the buy the hold policy, the initial portfolio is left undisturbed. It is essentially a 'buy and hold' policy. Irrespective of what happens to relative values, no rebalancing is done. For example, if the initial portfolio has a stock bond mix of 50:50 and after six months the stock bond mix happens to be, say 70:50 because the stock component has appreciated and the bond component has stagnated, the portfolio mix is allowed to drift. Put differently, no changes are effected.

The constant mix policy calls for maintaining the proportions of stocks and bonds in line with their target value. For examples, if the desired mix of stocks and bonds is say 50:50, the constant mix policy calls for rebalancing the portfolio when relative values of its components change, so that the target proportions are maintained.

The portfolio insurance policy cells for increasing the exposure to stocks when the portfolio appreciates in value and decreasing the exposure to stocks when the portfolio depreciates in value. The basic idea is the ensure that the portfolio value does not fall below a floor level.

2.6.13 Portfolio Upgrading

Portfolio upgrading calls for re-assessing the risk-return characteristics of various securities (stocks as well as bonds), selling over priced securities and buying under priced securities. It may also entail other changes the investor may consider necessary the enhance the performance of the portfolio. You may hesitate to revise your portflio or be too slow in doing so. You may not like to incur the costs of trading like commission cost, taxes, and adverse market impacts. These costs often look very obvious. However, remember that there are costs of non trading which, though subtle, may be significant. Your portfolio may drift into an asset mix that may no longer be appropriate to your needs; you may old over-priced investments, offering inferior, returns; you may forego opportunities of making promising investments. You should learn how to weigh the opportunity cost of non-trading against the explicit costs of trading. In essence, portfolio revision calls for developing an apropriate response to the tension between the 'apparent' cost of trading and the 'subtle' cost of inaction.

2.6.14 Performance Evaluation

The key dimensions of portfolio performance evaluation are rate of return and risk. This section looks at the measures of rate of return risk and performance.

2.6.15 Rate of Return

The rate of return from a portfolio for a given period (which may be defined as a period of one year) is measured as follows :

$$\frac{Dividend\ Income + Terminal\ Value - Initial\ Value}{Initial\ Value}$$

To illustrate the calculation of the rate of return, let us look at the following data : Initial market value of the portfolio Rs. 1,00,000 Dividend and interest income

received toward the end of the year Rs. 10,000 Terminal market value of the portfolio Rs. 1,05,000.

The rate of return on this portfolio is simply :

$$\frac{10,000 + 1,05,000 - 1,00,000}{1,00,000} = 0.15 \text{ or } 15 \text{ percent}$$

To calculate the average rate of return, over a period of several years, the following measures may be employed :

(a) arithmetic average of annual rates of return (b) internal rate of return (also referrred to as the money-weighted rate of return) and (c) geometric average of annual rates of return (also referred to as the time weight rate of return). The calculation of these measures may be illustrated with the help of the data given in following exhibit.

Rate of Return Data

Year	Market Value of Portfolio(rs)	Dividend & intt. income	Rate of Return
0	1,00,000		
1	1,05,000	10,000	
	$\frac{10,000 + (1,05,000 - 1,00,000)}{1,00,000} = 15$ *percent*		
2	95,000	10,000	
	$\frac{10,000 + (95,000 - 1,05,000)}{1,05,000} = 0\%$		
3	1,20,000	10,000	
	$\frac{10,000 + (1,20,000 - 95,000)}{95,000} = 36.8\%$		
4	1,40,000	12,000	
	$\frac{12,000 + (1,40,000 - 1,20,000)}{1,20,000} = 26.7\%$		
5	1,50,000	12,000	
	$\frac{12,000 + (1,50,000 - 1,40,000)}{1,40,000} = 15.7\%$		

The arthimetic average of annual rates of return in the above case is :

$$\frac{(15 + 0 + 36.8 + 26.7 + 15.7)}{5}\% = 18.8\%$$

The internal rate of return is defined as the discount rate which brings about an equality between the initial investment and the present value of future benefits associated with the investment. The internal rate of return in the above case is the value of or (which works out to 17.65) in the following equation :

$$1,00,000 = \frac{10,000 + 10,000 + 10,000 + 12,000}{(1+r)\ (1+r)^2\ (1+r)^3\ (1+r)^4} + \frac{12,000 + 1,50,000}{(1+r)^5}$$

The geometric mean of annual rates of return is the nth root of the product of annual wealth ratios (wealth ratio is simply 1+annual rate of return) minus 1. the geometric mean of annual ratesof return in the abvoe case is.

[(1+0.15) (1+0) (1+0.368) (1+0.267) (1+0.157)] 1/5 -1

= about 0.182 pr 18.2%

How useful or appropriate are the above measures of rate of returns 7 let us examine them one by one. The arithmetic average is annual rates of return is appealing because it is simple in concept and application. However, it suffers from a serious limitation. To understand this, consider a case where the market value of an investment of 100 made at the end of year declines to 80 at the end of year 1 and recovers to 100 at the end of year 2. Assuming that there is no dividend payment during the two year period, the annual returns and their arithmetic average are as follows :

Returns for year 1 : $\frac{80 - 100}{100}$ = -20 percent

Returns for year 2 : $\frac{80 - 100}{100}$ = 25 percent

Arithmetic average of annual return : $\frac{-20 + 25}{2}$ = 2.5 percent

Thus we find that although the return over the two year period is nil, the arithmetic average of annual returns works out to 2.5%. So this measure of return can be misleading. Hence it should be avoided. This leaves us with the remaining two measures, viz the internal rate of return and the geometric mean rate of return.

How useful is the internal rate of return, also referred to as the money-weighted rate of return ? To answer this question let us look at the internal rate of return of time portfolios, A and B that experience different cash flows as shown in following exhibit

Cash Flows of Portfolios A and B

	Periods			
	1	2	3	4
Rate of return earned	10%	30%	20%	----
Portfolio A				
1. Beginning value before inflow or outflow.	10,000	11,000	14,300	17,160
2. Inflow (outflow)	--------	-------	--------	(17,600)
3. Amount invested	10,000	11,000	14,300	--------
4. Ending Value	11,000	14,300	17,160	---------

Portfolio A				
1. Beginning value before inflow or outflow.	10,000	11,000	3,900	4,680
2. Inflow (outflow)	--------	(8,000)	--------	(4,680)
3. Amount invested	10,000	3,000	3,900	--------
4. Ending Value	11,000	3,900	4,680	---------

In portfolio, A, an intiial investment of 10,000 grows to 17,160 at the end of the year 3, with no intermediate cash flows. Hence, its internal rate of return is the value of r that satisfies the equation.

$$10{,}000 = \frac{17{,}160}{(1+r)^3}$$

Solving this equation, we get the value of r to be 19.72%

In portfolio B, an initial investment of 10,000 results in cash flows of 8,000 and 4,680 at the end of the year 1 and 3 respectively. Hence, its internal rate of return is the value of r that satisfied the equation.

$$10{,}000 \quad \frac{8{,}000}{(1+r)} + 0 + \frac{4{,}680}{(1+r)^2 \ (1+r)^3}$$

Solving this equation, we get the value of r to be 15.27%

This we find that though the period by period returns of both the portfolios are identical, the internal rate of return (or the money weighted rate of retturn) for portfolio A is greater than that for portfolio B. This is because the internal rate of return suffers from a limitation in that it is sensitive to the pattern of cash flows over which portfolio managers often have no control. Not that the internal rate of return reflects investment performance as well as the effect of contributions and withdrawals. Hence it is not correct so say that investment performance alone accounted for 15.27%. Indeed, you cannot judge the equality of investment performance from the internal rate of return figure. The internal rate of return however is useful in measuring the total experience of a fund, reflecting investment performance as well as cash flows.

The geometric mean rate of return (or the time-weighted rate of return) assigns equal weight to the result achieved in each time period and is independent of the pattern of cash flows. Hence, it is a superior measure. The geometric mean rate of return for both the portfolios shown in exhibit on page No. 32 is :

[1.10) (1.30) (1.20)] 1/2 - 1=0.1972 or 19.72 percent.

(a) Risk

The risk of a portfolio can be measured in various ways, The two most commonly used measures of risk are : variability and beta.

(b) Variability

The Bank Administration Insitute of the US recommended the use of variability [as measured by the mean absolute deviation (The mean absolute deviation of a set of returns of simply : ∑/d/n/where /d/ is equal to absolute deviation of a particular return from the arithmetic mean, n is equal to number of return observtions)] of the quarterly rates of return of the portfolio. Sharpe and other have also advocated the use of variability. However, their pereferred measure of variability is standard deviation.

(c) Beta :-

A measure of risk commonly advocated is beta. The beta of a portfolio is computed the way of the beta of an individual security is computed. To calculate the beta of a portfolio, aggress the rate of return of the portfolio on the rate of return of a market index. The slope of this regression line is the portfolio beta. Remember that is deflects the systematic risk of the portfolio.

2.6.5 Performance Measure :

For evaluating the performance of a portfolio it is necessary to consider both risk and return. This is what the treynor measure, the Sharpe measure and the Jensen measure the three popularly employed portfolio performance measures precisely do.

(i) Treynor Measure :-

According to Jack reynor, systematic risk or beta is the appropriate measure of risk, as suggested by the capital asset pricing modal. The Treynor measure of portfolio performance relates the excess return on a portfolio to the portfolio beta.

$$Treynor's\ measure = \frac{Excess\ return\ on\ portfolio\ P}{Beta\ of\ portfolio\ P}$$

$$= \frac{\begin{matrix}Average\ rate\ of\ return & Average\ rate\ of\ return\ on\ a\\ on\ portfolio\ P & risk\ free\ investment\end{matrix}}{Beta\ of\ portfolio\ P}$$

The numerator of the Treynor measure is the risk premium earned by the portfolio; the denominator, the systematic risk (beta). Hence the Treynor measure reflects the excess return earned per unit of risk. As systematic risk is the measure of risk, the Treynor measure implicity assumes that the portfolio is well diversified.

(ii) Sharpe measure :

The Sharpe measure is similar to the Treynor measure except that it employes standard deviation, not beta, as the measure of risk. Thus,

$$Sharpe\ measure \quad \frac{\begin{matrix}Average\ rate\ of\ return & Average\ rate\ of\ return\ on\ a\\ on\ portfolio\ P & risk\ free\ investment\end{matrix}}{S\tan dard\ deviation\ of\ return\ of\ portfolio\ P}$$

Hence, the sharpe measure reflects the excess return earned on a portfolio per unit of its total risk (standard deviation)

Note the followings :

A. Both the measures, the Treynor measure as well ast he sharpe measure, Postulate a linear relation ship between risk and return though they employ different measures of risk.

B. For a perfectly diversified portfolio both the measures give identical rankings because in such cases the total risk and systematic risk are the same.

(iii) Jensen measure :

Like the Treynor measure, the Jensen measure or Jensen's alpha is based on the capital asset princing model. It reflects the difference between the return actually earned on a portfolio and the return the portfolio was supposed to earn, given its beta as per the capital asset pricing modal. Thus, the Jensen measure is :

Average return on portfolio..... riskless rate of interest = intercept that measures forecasting ability of portfolio manager + a measure of systematic return (Average return on market-Riskfree rate of interest)

ILLUSTRATION

To illustrate the three measures of portfolio performance, let us look at the returns on the portfolio's of three mutual funds, A. B & C over a 9 years period, along with the return on a market index and the risk free return, given in following exhibit.

Annual Returns for three Mutual Funds and a Market Index

Period	Fund A	Fund B	Fund C	Return on market	Risk free Return	
1	-38.7	-16	-33	-26	7.9	
2	39.6	39.4	30	36.9	5.8	
3	11.1	34.3	18.2	23.6	5.0	
4	12.7	-6.9	-7.3	-7.2	5.3	
5	20.9	3.2	4.9	6.4	7.2	
6	35.5	28.9	30.9	18.2	10	
7	57.6	24.1	34.7	31.5	11.5	
8	-7.8	0.0	6.0	-4.8	14.1	
9	22.8	23.4	33.0	20.4	10.7	
Mean : RP		17.1	14.5	13.0	11	8.6
Standard Deviation : σP		28.1	19.7	22.8	20.5	----
Beta : βP		1.20	0.92	1.04	1.00	----

The performance of the above three funds A, B and C is as shown in following exhibit.

Performance Evaluation of the three Funds

Treynor Measure = $\frac{Rp - Rf}{\beta P}$

Fund A $\frac{17.1 - 8.6}{1.20} = 7.1$

Fund B $\frac{14.5 - 8.6}{0.92} = 4.9$

Fund C $\frac{13.0 - 8.6}{1.04} = 4.8$

Market Index $\frac{11.0 - 8.6}{1.0} = 2.4$

Sharpe Measure $\frac{Rp - Rf}{\sigma p}$

Fund A $\frac{17.1 - 8.6}{28.1} = 0.302$

Fund B $\frac{14.5 - 8.6}{19.7} = 0.299$

Fund C $\frac{13.0 - 8.6}{22.8} = 0.193$

Market Index $\frac{11.0 - 8.6}{20.5} = 0.177$

Jensen Measure = RP $\left[Rf + \beta p\ (Rm - Rf)\right]$

Fund A 17.1-[8.6+1.20(2.4)]=5.62
Fund B 14.5-[8.6+0.92(2.4)]=3.69
Fund C 13.0-[8.6+1.04(2.4)]=1.90
Market Index 0 (By definition)

Problem with performance measurement

Performance measurement is basically a good idea. In practice, however, it is often not applied properly. Performance is measure too frequently and judgements are formed on the basis of very short-time frames. Such an approach has certain negative or dysfunctinal consequencies;

(a) it has attempted to quantity a function that is only partly amenable to quantification.

(b) it has led to 'short-term's in investment decisions

(c) it has promoted the cult of market timing.

2.6.17 Summary

It must be recognized that it is not feasible to evaluate the ability of a money manager over a short period of one of three years when it should be appraised over a period of five to seven years. As Peter O Dietz and Jeannette R. Kirsch man wrote. For accuracy of computations, performance should be computed as often as practical, but results should not be taken as significant by the investor or the investment manager until a reasonable period of time, such as a market cycle for equities or an interest rate cycle for fixed income securiteis has elapsed. The lesson discusses in detail the methods of portfolio selection, revision and of rebalancing. It also highlighted portfolio upgradation and the concept of portfolio performance evaluation with the help of different methods.

2.6.18 Self check Exercise

1. What is Risk Return Trade off
2. What is portfolio revision
3. Explain Performance Evaluation

2.6.19 Glossary :-

(i) Portfolio Upgrading : It involves for re-assessing the risk return characteristics of various securities.

(ii) Performance Evaluation : It involves analysis of the measures of rate of return, risk and performance.

(iii) Porfolio Rebalancing : It involves reviewing and revising the portfolio computer (i.e. the stock bond mix).

(iv) Sector Rotation : It invovles shifting the weight for various industrial sector based in their absessed outlook.

2.6.20 Questions for Exercise

Long Question

(i) Discuss the process of portfolio management.

(ii) Discuss the measures used for evaluating the performance of a portfolio.

(iii) How is the selection of asset mix done in portfolio management.

Short Question

1. Briefly explain the formulation of a portfolio strategy
2. Explain portfolio upgrading
3. What are the various problems with performance measurement of portfolio.

2.6.21 Recommended Reading

1. Investment Analysis and Portfolio management -Prasanna Chandra-TMH-2nd Edition, 2005.
2. Investment-Zvi Bodie, & Mohanty-TMH-6th Edition, 2007.
3. Investment Management-VK Bhalla (S.Chand & Co.), 2009.
4. Investment Analysis & Portfolio Management-Reilly-8/e-Thomson/Cengage learning.
5. Security Analysis & Portfolio Management-Fisher and Jordan, 6/e Pearson/PHI, 2009.
6. Alexander, Sharpe, Bailley-Fundamentals of Investment-Pearson/PHI, 2009.

7. Portfolio Management-Barua, Verma and Raghunathan (TMH), 1/e, 2006.
8. Reilly & Brown-Investment Analysis & Portfolio Mgmt.-Thomson Learning, 7/e, 2007.
9. Ranganathan & Madhumathi-Investment Analysis & Portfokio Mgmt.-Pearson, PHI.

10. Punithavathy Pandian - Security Analysis & Portfolio Mgmt.- Vikas Publications, 2009.
11. Practical Investment Arrangement-Strong-Thomson/Cengage Learning 3/e.
12. Fischer Donald E., Jordan Ronald J. Security Analysis and Portfolio Management, Prentice hall of India, New Delhi.
13. V.A. Avadhani, Investment Management, Himalaya Publishing House, Mumbai, 2003.

Mandatory Student Feedback Form

https://forms.gle/KS5CLhvpwrpgjwN98

Note: Students, kindly click this google form link, and fill this feedback form once.