

Securities Analysis & Portfolio Management

Presented By
Md. Ashrafur Islam
Director, SEC

Contents

Part-A: Investment fundamentals

- Understanding investment
- Some definitions
- Sources and types of risk
- Risk-return trade-off in different types of securities
- Important considerations in investment process

Part-B: Securities Analysis

- Securities analysis concept and types
- Framework of fundamental securities analysis
- Intrinsic valuation & relative valuation

Part-C: Portfolio Management

- Portfolio concept
- Modern Portfolio Theory: Markowitz Portfolio Theory
- Determination of optimum portfolio
- Single-Index model, Multi-Index model
- Capital Market Theory
- Portfolio performance measurement

Part-A

Investment Fundamentals

Understanding investment

Investment is commitment of fund to one or more assets that is held over some future time period.

- Investing may be very conservative as well as aggressively speculative.
- Whatever be the perspective, investment is important to improve future welfare.
- Funds to be invested may come from assets already owned, borrowed money, savings or foregone consumptions.
- By forgoing consumption today and investing the savings, investors expect to enhance their future consumption possibilities by increasing their wealth.
- Investment can be made to intangible assets like marketable securities or to real assets like gold, real estate etc. More generally it refers to investment in financial assets.

- *Investments* refers to the study of the investment process, generally in financial assets like marketable securities to maximize investor's wealth, which is the sum of investor's current income and present value of future income. It has two primary functions: analysis and management.
- *Whether Investments is Arts or Science?*

Some definitions:

- *Financial assets:* These are pieces of paper (or electronic) evidencing claim on some issuer.
- *Marketable securities:* Financial assets that are easily and cheaply traded in organized markets.
- *Portfolio:* The securities held by an investor taken as a unit.
- *Expected return:* Investors invest with the hope to earn a return by holding the investment over a certain time period.
- *Realized return:* The rate of return that is earned after maturity of investment period.
- *Risk:* The chance that expected return may not be achieved in reality.

- Risk-Free Rate of Return: A return on riskless asset, often proxied by the rate of return on treasury bills.
- Risk-Adverse Investor: An investor who will not assume a given level of risk unless there is an expectation of adequate compensation for having done so.
- Risk Premium: The additional return beyond risk free rate that is required for making investment decision in risky assets.

Definitions conti....

- Passive Investment Strategy: A strategy that determines initial investment proportions and assets and make few changes over time.
- Active Investment Strategy: A strategy that seeks to change investment proportions and assets in the belief that profits can be made.
- Efficient Market Hypothesis(EMH): The proposition that security markets are efficient, in the sense that price of securities reflect their economic value based on price sensitive information.
 - Weak-form EMH
 - Semi-strong EMH
 - Strong EMH

Definitions Conti....

- Face value or Par value or Stated value: The value at which corporation issue its shares in case of common share or the redemption value paid at maturity in case of bond. New stock is usually sold at more than par value, with the difference being recorded on balance sheet as “capital in excess of par value”.
- Book Value: The accounting value of equity as shown in the balance sheet. It is the sum of common stock outstanding, capital in excess of par value, and retained earnings. Dividing this sum or total book value by the number of common shares outstanding produces the book value per share. Although it plays an important role in investment decision, market value per share is the critical item of interest to investors.

Sources and Types of Risk

■ Sources of Risk:

- Interest rate risk
- Market risk
- Inflation risk
- Business risk
- Financial risk
- Liquidity risk
- Exchange rate risk
- Country risk

■ Broad Types:

- Systematic/Market Risk
- Non-systematic/Non-market/Company-specific Risk

Risk-return trade-off in different types of securities

Various types of securities:

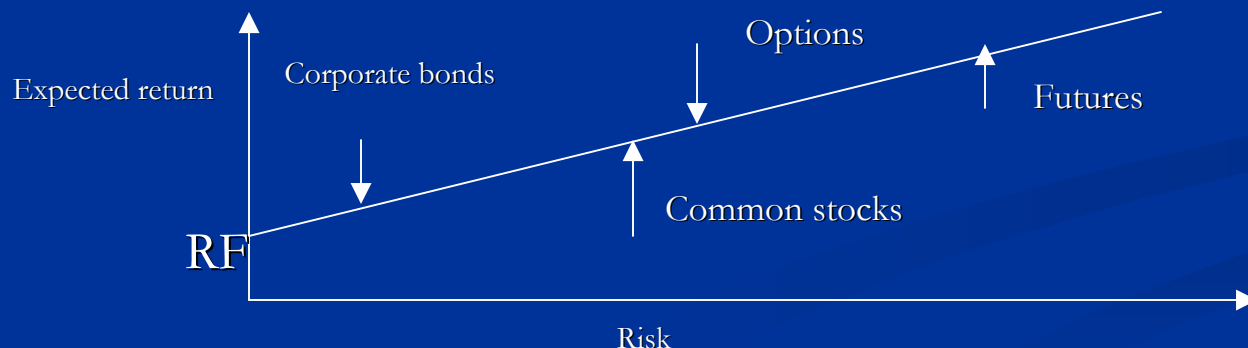
■ Equity securities may be

- -Ordinary share or Common share, gives real ownership because holder bears ultimate risk and enjoy return and have voting rights
- -Preferential share, enjoy fixed dividend, avoids risk, do not have voting right.

■ Debt securities may be

- -Bond, a secured debt instrument, payable on first on liquidity
- -Debenture, an unsecured debt instrument,

■ Derivative securities are those that derive their value in whole or in part by having a claim on some underlying value. Options and futures are derivative securities



Factors Affecting Security Prices

- Stock splits
- Dividend announcements
- Initial public offerings
- Reactions to macro and micro economic news
- Demand/supply of securities in the market
- Marketability of securities
- Dividend payments
- Many others

Direct investment and indirect investment

- In *Direct Investing*, investors buy and sell securities themselves, typically through brokerage accounts. Active investors may prefer this type of investing.
- In *Indirect Investing*, investors buy and sell shares of investment companies, which in turn hold portfolios of securities. Individual who are not active may prefer this type of investing.

Important considerations in investment decision process:

- Investment decision should be considered based on economy, industry consideration and company fundamentals including management & financial performance
- Investment decision process can be lengthy and involved
- The great unknown may exist whatever be the individual actions
- Global investment arena
- New economy vrs old economy stocks
- The rise of the internet- a true revolution for investment information.
- Institutional investors vrs individual investor
- Risk-return preference

Traditionally, investors have analyzed and managed securities using a broad two-step process:

- security analysis and
- portfolio management

Part-B

Securities Analysis

Security Analysis Concept & Types

- ***Security analysis*** is the first part of investment decision process involving the valuation and analysis of individual securities. Two basic approaches of security analysis are fundamental analysis and technical analysis.
 - ***Fundament analysis*** is the study of stocks value using basic financial variables in order to determine company's intrinsic value. The variables are sales, profit margin, depreciation, tax rate, sources of financing, asset utilization and other factors. Additional analysis could involve the company's competitive position in the industry, labor relations, technological changes, management, foreign competition, and so on.
 - ***Technical analysis*** is the search for identifiable and recurring stock price patterns.
 - ***Behavioral Finance Implications:*** Investors are aware of market efficiency but sometimes overlook the issue of psychology in financial markets- that is, the **role that emotions play**. Particularly, in short turn, investors' emotions affect stock prices, and markets

Framework for Fundamental Analysis:

- ***Bottom-up approach***, where investors focus directly on a company's basic. Analysis of such information as the company's products, its competitive position and its financial status leads to an estimate of the company's earnings potential and ultimately its value in the market. **The emphasis in this approach is on finding companies with good growth prospect, and making accurate earnings estimates.** Thus bottom-up fundamental research is broken in two categories: ***growth investing*** and ***value investing***

- **Growth Stock:**

It carry investor expectation of above average future growth in earnings and above average valuations as a result of high price/earnings ratios. Investors expect these stocks to perform well in future and they are willing to pay high multiples for this expected growth.

- **Value Stock:** Features cheap assets and strong balance sheets.

In many cases, bottom-up investing does not attempt to make a clear distinction between growth and value stocks. Top-down approach is better approach.

Top-down Approach

- In this approach
 - investors begin with economy/market considering interest rates and inflation to find out favorable time to invest in common stock
 - then consider future industry/sector prospect to determine which industry/sector to invest in
 - Finally promising individual companies of interest in the prospective sectors are analyzed for investment decision.

Fundamental Analysis at Company Level:

- There are two basic approaches for valuation of common stocks using fundamental analysis, which are:
 - ***Intrinsic Valuation***: Discounted cash flow(DCF) technique. One form of DCF is Dividend Discount Model(DDM), that uses present value method by discounting back all future dividends
 - ***Relative Valuation*** Model, uses P/E ratio, P/B ratio and P/S ratio

Intrinsic Valuation, DDM:

- In this method, an investor or analyst carefully studies the future prospects for a company and estimates the likely dividends to be paid, which are the only payments an investor receives directly from a company. In addition, the analyst estimates an appropriate required rate of return on the risk foreseen in the dividends. Then calculate the estimated discounted present value of all future dividends as below:

$$\text{PV of stock, } V_0 = \frac{D1}{(1+k)} + \frac{D2}{(1+k)^2} + \frac{D3}{(1+k)^3} + \dots$$
$$= \frac{D1}{(k - g)} \quad \dots \quad (\text{after simplification})$$

where, D1, D2, D3..are future 1st, 2nd , 3rd years dividends, k is required rate of return

Now,

If $V_0 > P_0$, the stock is undervalued and should be purchased

If $V_0 < P_0$, the stock is overvalued and should be not be purchased

If $V_0 = P_0$, the stock is at correctly priced

Alternatively, in practice, investors can use DDM to select stocks. The expected rate of return, k, for constant growth stock can be written as

$k = \frac{D1}{P_0} + g$, where $\frac{D1}{P_0}$ is dividend yield and the 2nd part g is price change component

Relative Valuation

- Relative valuation technique uses comparisons to determine a stock's value. By calculating measures such as P/E ratio and making comparisons to some benchmark(s) such as the market, an industry or other stocks history over time, analyst can avoid having to estimate g and k parameters of DDM.
- In relative valuation, investors use several different ratios such as P/E, P/B, P/S etc in an attempt to assess value of a stock through comparison with benchmark.

Earning Multiplier or P/E Ratio

Model:

- This model is the best-known and most widely used model for stock valuation. Analysts are more comfortable talking about earning per share (EPS) and P/E ratios, and this is how their reports are worded.
- *P/E ratio simply means the multiples of earnings at which the stock is selling.* For example, if a stock's most recent 12 months earning is Tk 5 and its is selling now at Tk 150, then it is said that the stock is selling for a multiple of 30.

Determinants of P/E Ratio:

- For a constant growth model of DDM,

Price of a stock, $P = D_1 / (k - g)$

Or, $P/E = (D_1/E) / (k - g)$

This indicates that P/E depends on:

1. Expected dividend payout ratio, D_1/E
2. Required rate of return, k , which is to be estimated
3. Expected growth rate of dividends

Thus following relationship should hold, being other things equal:

1. The higher the expected payout ratio, the higher the P/E ratio
2. The higher the expected growth rate, the higher the P/E ratio
3. The higher the required rate of return, the lower the P/E ratio

Valuation Using P/E Ratio:

- To use the earnings multiplier model for valuation of a stock, investors must look ahead because valuation is always forward looking. They can do this by making a forecast of next year's earnings per share E_1 , assuming a constant growth model, as

Next years earning per share, $E_1 = E_0(1+g)$

where, $g = \text{ROE} \times (1 - \text{Payout ratio})$

Then calculate the forward P/E ratio as

Forward P/E ratio = P_0/E_1 , where E_1 is expected earning for next year

- In practice, analysts often recommend stocks on the basis of this forward P/E ratio or multiplier by making a relative judgment with some benchmark.

Other Relative Valuation Ratios:

- **Price to Book Value(P/B):** This is the ratio of stock price to per share stockholders' equity.

Analysts recommend lower P/B stock compared to its own ratio over time, its industry ratio, and the market ratio as a whole.

- **Price to Sales Ratio(P/S):** A company's stock price divided by its sales per share.

A PSR 1.0 is average for all companies but it is important to interpret the ratio within industry bounds and its own historical average.

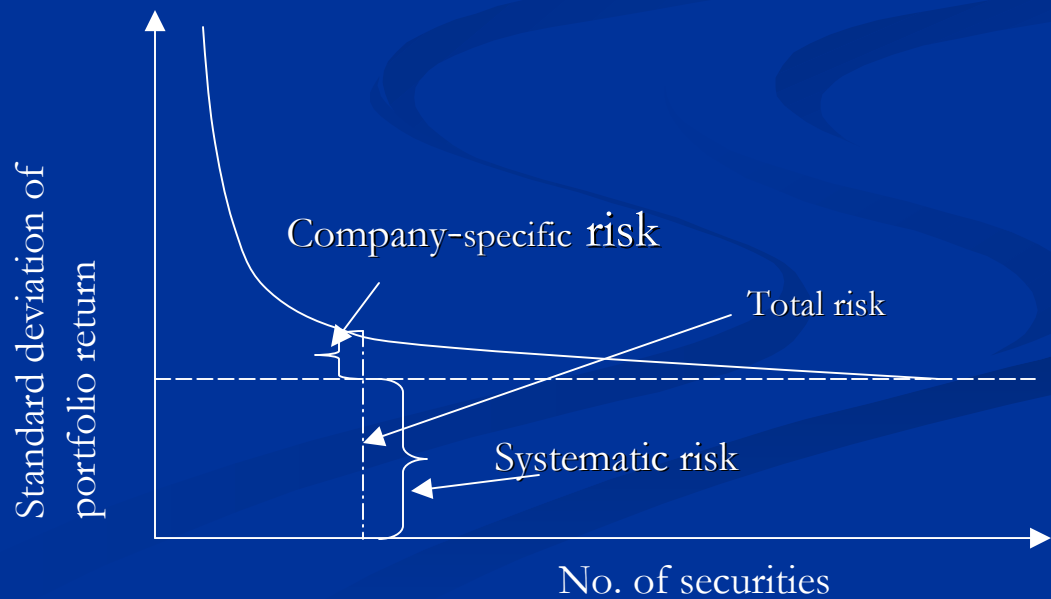
Part-C

Portfolio Management

Risk Diversification- the objective of portfolio formation without affecting the return significantly

If the rates of return on individual securities are dependent only on company-specific risks of that company and these returns are statistically independent of other securities' returns, then in that case, the standard deviation of return of the portfolio (formed by n number of securities) is given by

$$\sigma_p = \frac{\sigma_i}{\sqrt{n}} \quad (1)$$



Risk Diversification

- Risk diversification is the key to the management of portfolio risk, because it allows investors to significantly lower the portfolio risk without adversely affecting return.
- Diversification types:
 - Random or naive diversification
 - Efficient diversification

Random or naive diversification:

- It refers to the act of randomly diversifying *without regard to relevant investment characteristics such as expected return and industry classification*. An investor simply selects a relatively large number of securities randomly.
- Unfortunately, in such case, the benefits of random diversification do not continue as we add more securities, the reduction becomes smaller and smaller.

Efficient diversification

- **Efficient diversification** takes place in an efficient portfolio that has the smallest portfolio risk for a given level of expected return or the largest expected return for a given level of risk. Investors can specify a portfolio risk level they are willing to assume and maximize the expected return on the portfolio for this level of risk.
- **Rational investors** look for efficient portfolios, because these portfolios are optimized on the two dimensions of most importance to investors- return and risk.

Modern Portfolio Theory

- In 1952, Markowitz, the father of modern portfolio theory, developed the basic principle of portfolio diversification in a formal way, in quantified form, that shows why and how portfolio diversification works to reduce the risk of a portfolio to an investor. *Modern Portfolio theory hypothesizes how investors should behave.*
- According to Markowitz, the portfolio risk is not simply a weighted average of the risks brought by individual securities in the portfolio but it also includes the risks that occurs due to correlations among the securities in the portfolio. As the no. of securities in the portfolio increases, contribution of individual security's risk decreases due to offsetting effect of strong performing and poor performing securities in the portfolio and the importance of covariance relationships among securities increases. Thus the portfolio risk is given by

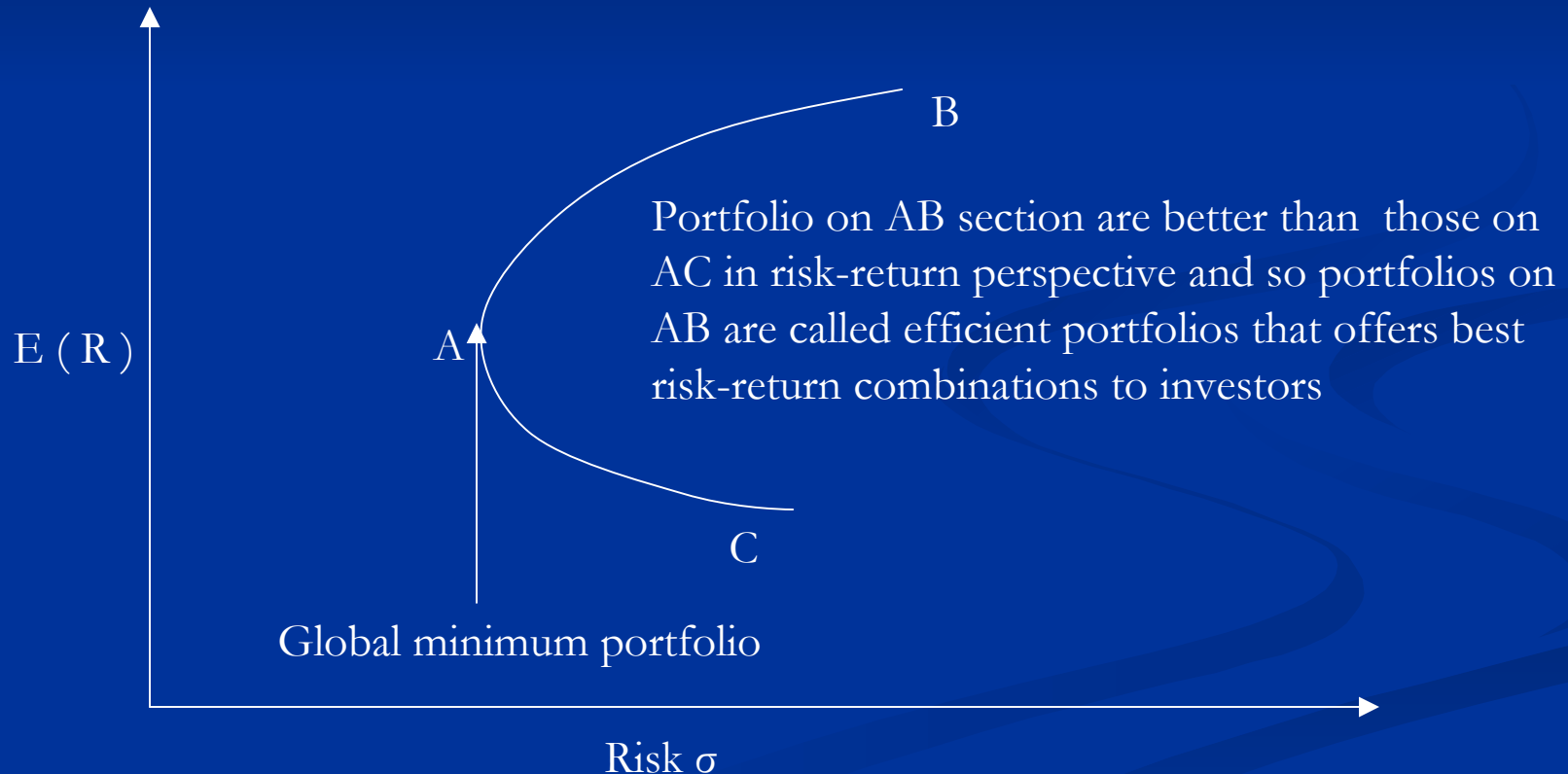
$$\sigma^2_p = \sum w_i^2 \sigma_i^2 + \sum \sum w_i w_j \rho_{ij} \sigma_i \sigma_j$$

$$= \sum \sum w_i w_j \rho_{ij} \sigma_i \sigma_j$$

(the 1st term is neglected for large n)

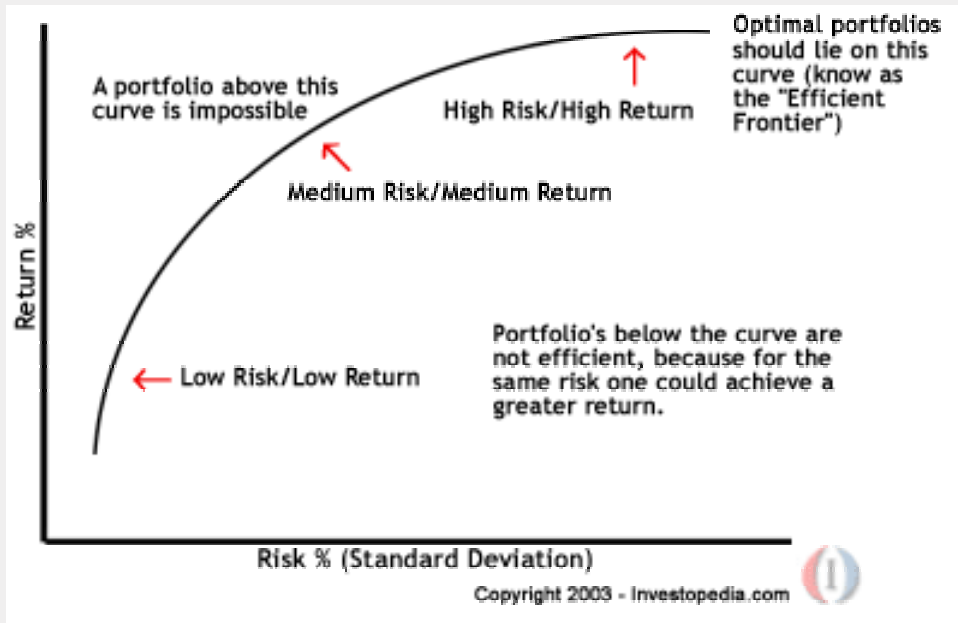
Efficient Frontiers

Graph for the risk-return trade-off according to Markowitz portfolio theory is drawn below.



Computing Problem with Original Markowitz Theory, and Later Simplification

- As n increases, $n(n-1)$ covariances (inputs) are required to calculate under Markowitz model. Due to this complexity of computation, it was mainly used for academic purposes before simplification.
- It was observed that mirror images of covariances were present in Markowitz's model. So after excluding the mirror images in the simplified form, $n(n-1)/2$ unique covariances are required for using this model and since then it is being used by investors.



Markowitz Model for Selection of Optimal Asset Classes-Asset Allocation Decision:

- Markowitz model is typically thought of in terms of selecting portfolios of individual securities. But alternatively, it can be used as a selection technique for asset classes and asset allocation.

Single Index Model - An Alternative Simplified Approach to Determine Efficient Frontiers

- Single-Index model assumes that the risk of return from each security has two components-
 - the market related component($\beta_i R_M$) caused by macro events and
 - the company-specific component(e_i) which is a random residual error caused by micro events.
- The security responds only to market index movement as residual errors of the securities are uncorrelated. The residual errors occur due to deviations from the fitted relationship between security return and market return. For any period, it represents the difference between the actual return(R_i) and the return predicted by the parameters of the model($\beta_i R_M$)

■ The Single Index model is given by the equation:

$$R_i = \alpha_i + \beta_i R_M + e_i \dots\dots\dots \text{for security } i, \text{ where}$$

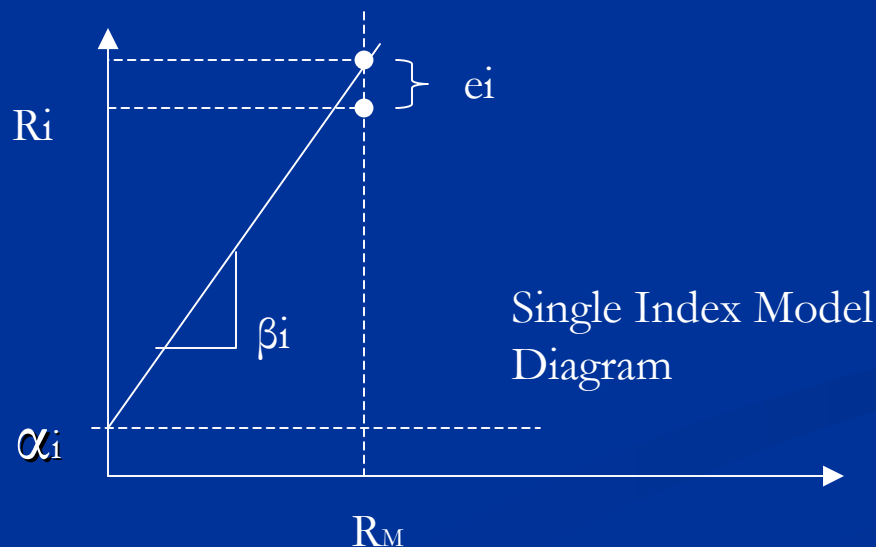
R_i = the return on security

R_M = the return from the market index

α_i = risk free part of security i 's return which is independent of market return

β_i = sensitivity of security i , a measure of change of R_i for per unit change R_M , which is a constant

e_i = random residual error, which is company specific



Single Index Model.....

- Total risk of a security , as measured by its variance, consists of two components: market risk and unique risk and given by

$$\sigma_i^2 = \beta_i^2 [\sigma_M^2] + \sigma_{ei}^2$$

=Market risk + company-specific risk

This simplification also applies to portfolios, providing an alternative expression to use in finding the minimum variance set of portfolios:

$$\sigma_p^2 = \beta_p^2 [\sigma_M^2] + \sigma_{ep}^2$$

- The Single-Index model is an alternative to Markowitz model to determine the efficient frontiers with much fewer calculations, $3n+2$ calculations, instead of $n(n-1)/2$ calculations. For 20 securities, it requires 62 inputs instead of 190 in Markowitz model.

Multi-Index Model

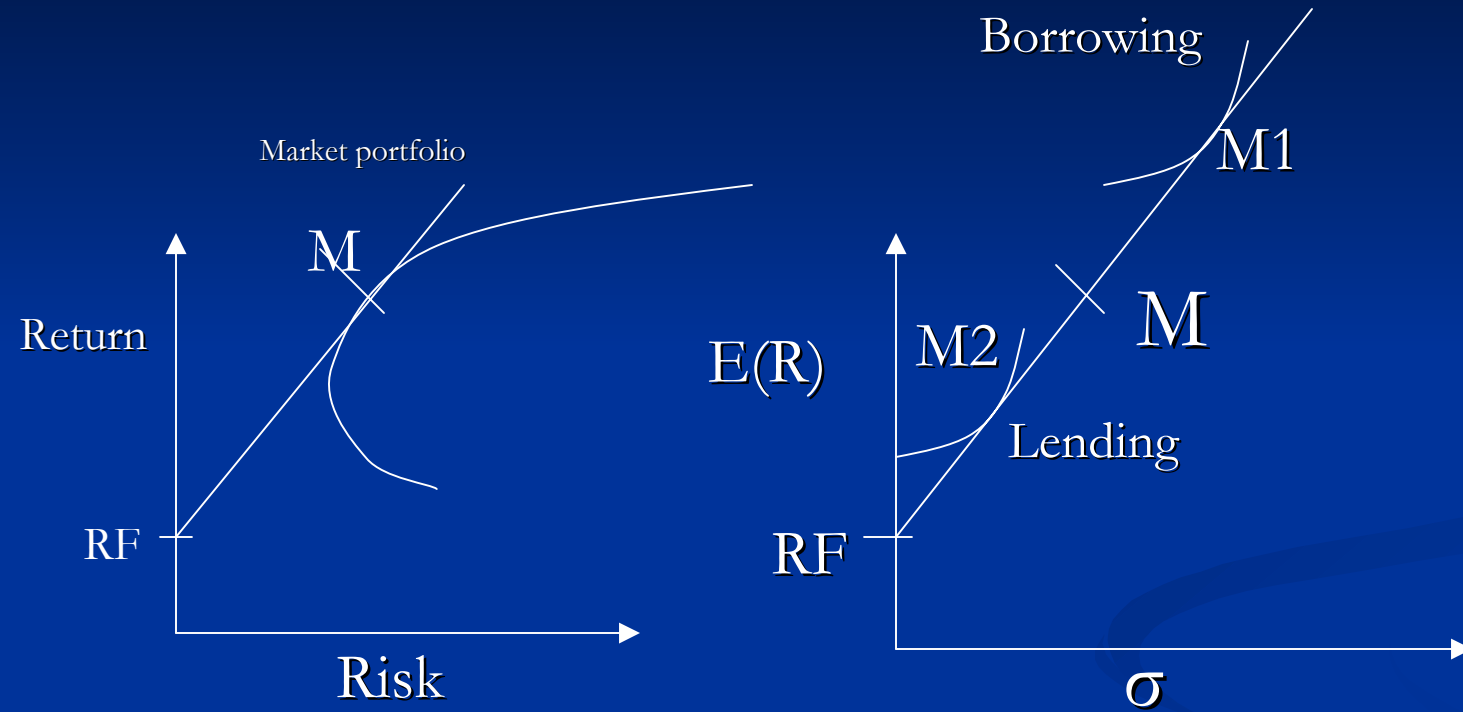
- Some researchers have attempted to capture some non-market influences on stock price by constructing Multi-Index model. Probably the most obvious non-market influence is the industry factor. Multi-index model is given by the equation:

$$E(R_i) = a_i + b_i R_M + c_i NF + e_i, \text{ where } NF = \text{non-market factor}$$

Capital Market Theory(CMT)

- Capital market theory hypothesizes how investors behave rather than how they should behave as in Markowitz portfolio theory. CMT is based on Markowitz theory and but it is an extension of that.
- The more the risk is involved in an investment, the more the return is required to motivate the investors. It plays a central role in asset pricing, because it is the risk that investors undertake with expectation to be rewarded.
- CMT is build on Markowitz Portfolio theory and extended with introduction of risk-free asset that allows investors borrowing and lending at risk-free rate and at this, the efficient frontier is completely changed, which in tern leads to a general theory for pricing asset under uncertainty. Borrowing additional ingestible fund and investing together with investor's wealth allows investors to seek higher expected return, while assuming greater risk. Likewise, lending part of investor's wealth at risk-free rate, investors can reduce risk at the expense of reduced expected return.

CMT Graphs:



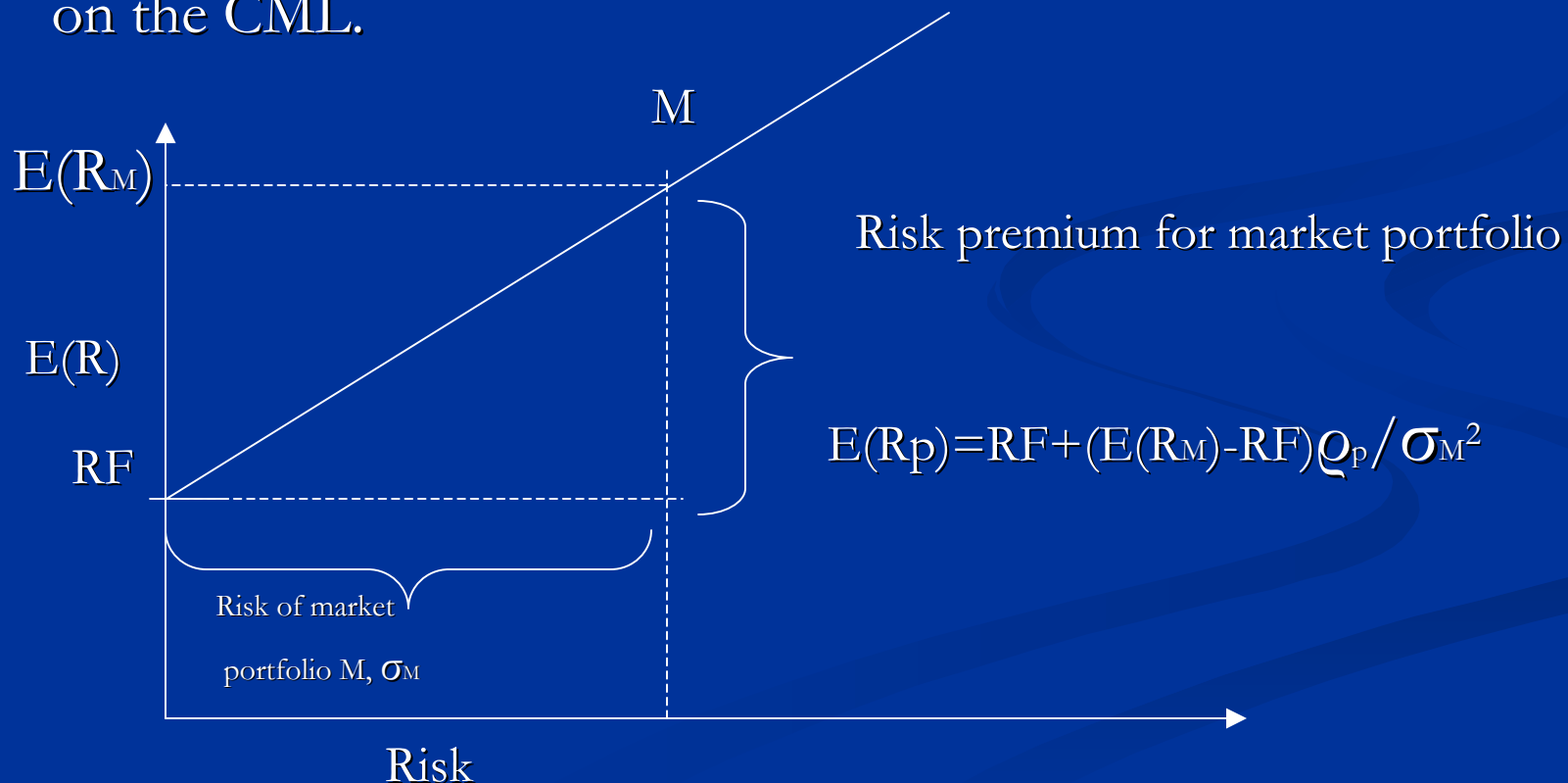
CAPM and Its Two Specifications: CML, SML

- *CAPM(Capital Asset Pricing Model)*

This is a form of CMT, and it is an equilibrium model, allows us to measure the relevant risk of an individual security as well as to assess the relationship between risk and the returns expected from investing. It has two specifications: CML & SML

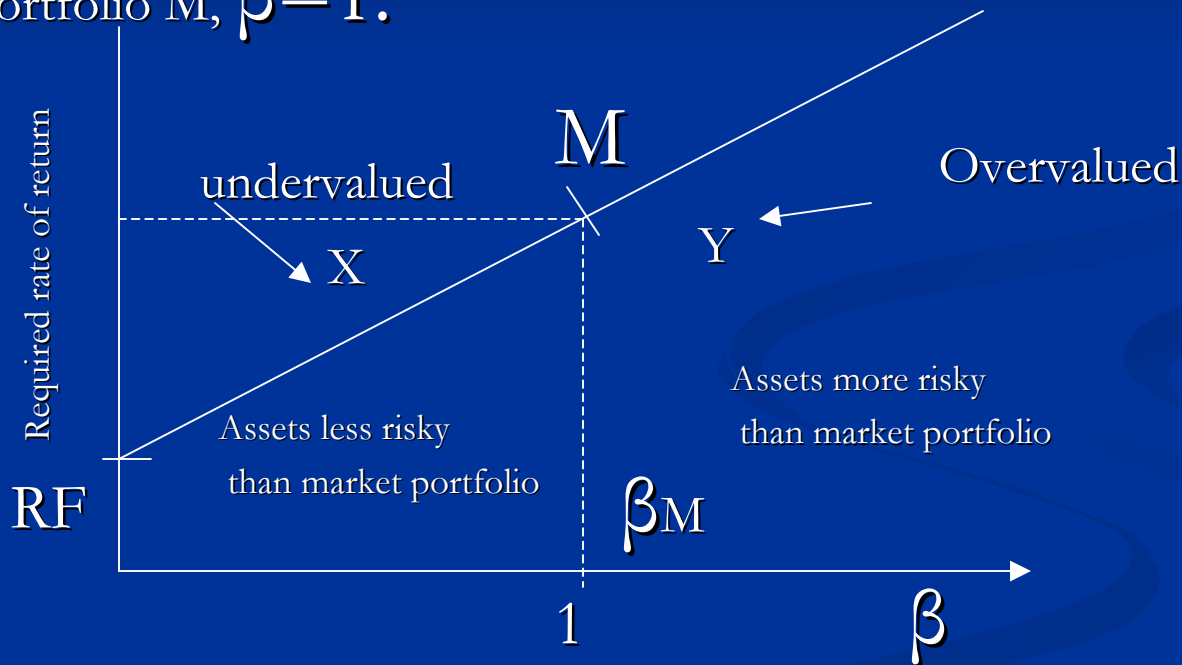
CML:

- **CML(Capital Market Line):** A straight line, depicts equilibrium conditions that prevails in the market for efficient portfolios consisting of the optimal portfolio risky assets and the risk-free asset. All combinations of the risk-free asset and risky portfolio M are on CML, and in equilibrium, all investors will end up with portfolios somewhere on the CML.



SML:

- **SML (Security Market Line):** It says that the expected rate of return from an asset is function of the two components of the required rate of return- the risk free rate and risk premium, and can be written by, $k=RF+\beta(E(R_M)-RF)$. At market portfolio M, $\beta=1$.



SML.....

- CAPM formally relates the expected rate of return for any security of portfolio with the relevant risk measure. This is the most cited form of relationship and graphical representation of CAPM.
- *Beta* is the change in risk on an individual security influenced by 1 percent change in market portfolio return. Beta is the relevant measure of risk that can not be diversified away in a portfolio of securities and, as such, is the measure that investors should consider in their portfolio management decision process.

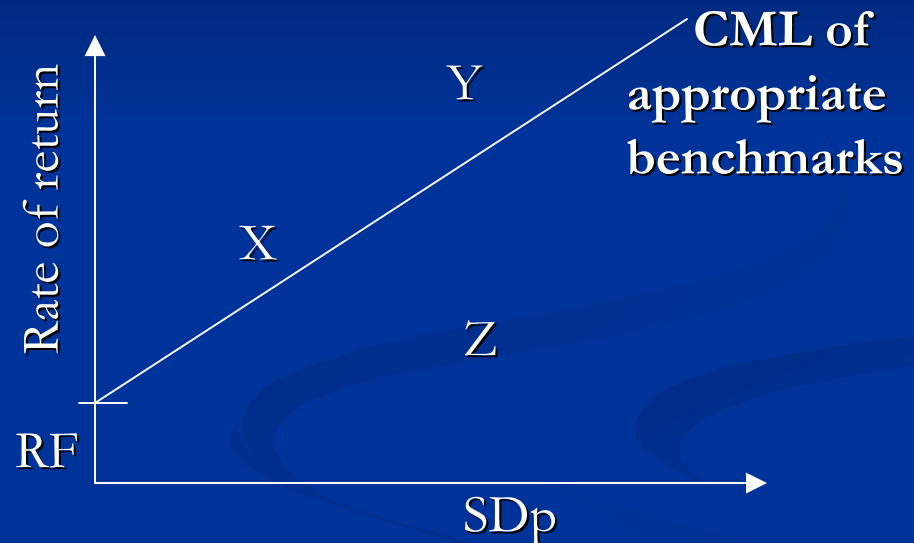
Portfolio Performance Measurement

■ Sharpe's measure (Reward to Variability Ratio, RVAR):

The performance of portfolio is calculated in Sharpe's measure as the ratio of excess portfolio return to the standard deviation of return for the portfolio.

$$\text{RVAR} = (\overline{\text{TR}}_p - \overline{\text{RF}}) / \text{SD}_p$$

- Efficient portfolios lie on CML
- Outperformers lie above CML
- Underperformers lie under CML



Note about RVAR:

- It measures the excess return per unit of total risk (SD_p) of the portfolio
- The higher the RVAR, the better the portfolio performance
- Portfolios can be ranked by RVAR and best performing one can be determined
- Appropriate benchmark is used for relative comparisons in performance measurement

Portfolio Performance

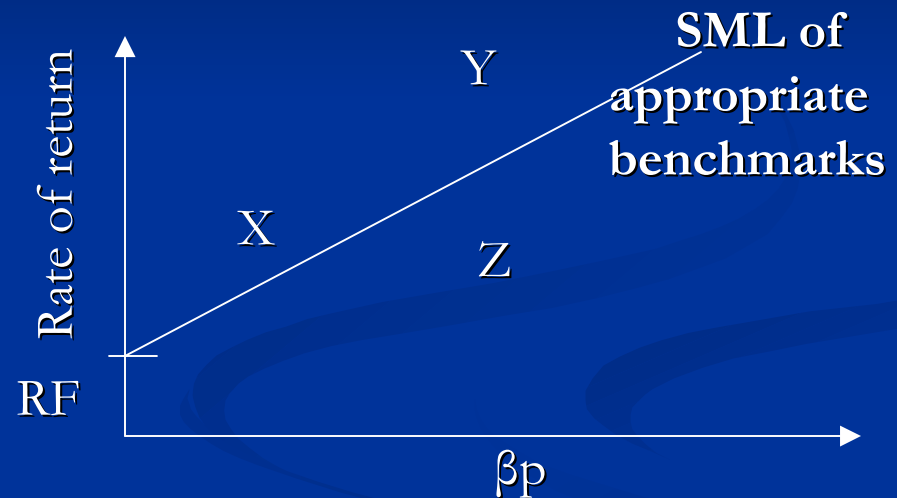
Measurement.....

■ Treynor's measure (Reward to Volatility Ratio, RVOR)

The performance of portfolio is calculated in Treynor's measure as the ratio of excess portfolio return to the beta of the portfolio which is systematic risk.

$$RVOR = (TR_p - RF) / \beta_p$$

- Efficient portfolios lie on SML
- Outperformers lie above SML
- Underperformers lie under SML



Note about RVOL:

- It measures the excess return per unit of systematic risk (β_p) of the portfolio
- The higher the RVOR, the better the portfolio performance
- Portfolios can be ranked by RVOR and best performing one can be determined

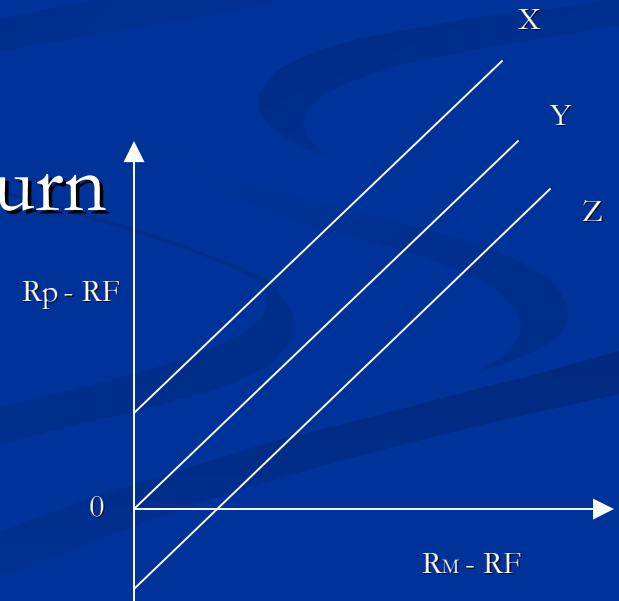
Portfolio Performance Measurement.....

■ Jensen's Differential Return Measure, α :

It is calculated as the difference between what the portfolio actually earned and what it was expected to earn given the portfolio's level of systematic risk.

$$\alpha_p = (\overline{R_p} - \overline{R_F}) - [\beta_p (\overline{R_M} - \overline{R_F})]$$

= Actual return – required return



Portfolio monitoring and rebalancing

- It is important to monitor market conditions, relative asset mix and investors' circumstances. These changes dynamically and frequently and so there is need for rebalancing the portfolio towards optimal point.

Thank You