



DAFFODIL INSTITUTE OF INFORMATION TECHNOLOGY (DIIT)

Third Year, Sixth Semester

BBA (Honours) in Tourism and Hospitality Management (THM)

Fundamentals of Finance

Chapter -2

Concepts of Risk and Return

1. What is APT and CAPM? (2009) Or. Define & discuss the property of CAPM and APT. (2007)

APT: The Arbitrage Pricing Theory (APT) was developed by Ross (1976) as a substitute for the CAPM. It is used to find the rate of return of a security. APT allows the individual investor to find out expected return for a particular asset.

Arbitrage Pricing Theory (APT) is commonly used models for pricing all risky assets based on their relevant risks. This theory predicts a relationship between the returns of a portfolio and the returns of a single asset through a linear combination of many independent macro-economic variables.

Formula of CAPM:

$$E(R) = R_f + \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 \dots$$

CAPM: Capital asset pricing model (CAPM) is an empirical model used to determine a theoretically appropriate required rate of return of an asset. Capital Asset Pricing Model (CAPM) calculates the required rate of return for any risky asset based on the security's beta.

Formula of CAPM:

$$E(R) = R_f + (R_m - R_f) \beta$$

Or. What is APT?

In finance, arbitrage pricing theory (APT) is a general theory of asset pricing that holds that the expected return of a financial asset can be modeled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient.

2. Difference between APT and CAPM. (2011)

Or. What is the primary difference between APT & the CAPM? (2008)

Or. In what contest does APT theory differ from CAPM. (2011)

Particulars	APT	CAPM
Definition	Arbitrage Pricing Theory (APT) is commonly used models for pricing	Capital Asset Pricing Model (CAPM) calculates the required rate of return

	all risky assets based on their relevant risks.	for any risky asset based on the security's beta.
Accuracy	APT may be informative over the medium to long term, but are not considered to be accurate in the short term.	The CAPM, on the other hand, is a snapshot, and appears to be more accurate in the short term than it is in the long term
Formula	$E(R) = R_f + \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \dots$	$E(R) = R_f + (R_m - R_f) \beta$
Consider	The APT focuses on risk factors rather than assets, so it has an advantage over the CAPM.	The CAPM focuses on assets factors rather than risk.
Relationship	The CAPM assumes that there is a linear relationship between the assets.	APT assumes that there is a linear relationship between risk factors.

3. What is risk? How can risk of a security be calculated? (2009)

Risk: The chance that an investment's actual return will be different than expected. Risk includes the possibility of losing some or all of the original investment. Different versions of risk are usually measured by calculating the standard deviation of the historical returns or average returns of a specific investment. A high standard deviation indicates a high degree of risk.

We can measure risk of a security in the following ways:

- 1. Range:** The risk of an asset can be measured by the range of return. The range is found by subtracting the return related to the pessimistic outcome from the return related to the optimistic outcome. The greater the range, the greater the risk of an asset.

	Asset -A	Asset-B
Investment	5000	5000
Pessimistic	10%	5%
Most likely	15%	15%
Optimistic	20%	25%
Range	10%	20%

Asset A appears to have less risky than the asset B because it has lower range of return than B.

- 2. Standard deviation:** It measures the total risk of an asset or portfolio. It measures the deviation between actual return and expected return.

$$\sigma = \sqrt{(x_i - \bar{x})^2 \times p_i}$$

The higher the standard deviation the higher is the risk of an asset.

- 3. Coefficient of variation:** The coefficient of variation is the measure of relative risk of an asset. It can be calculated as the standard deviation divided by expected return. The C.V allows us to know to determine how much volatility you are assuming in comparison to the amount of return you can expect from your investment.

$$C.V = \frac{\text{Standard Deviation } (\sigma)}{\text{Expected return } (\bar{X})}$$

Or. How can risk of a security be calculated?

The most difficult part of this entire process is *risk identification*. A risk is the likeliness of a threat actually leading to an incident. Predicting the chances of something being stolen or damaged is not an easy task. For the sake of budgeting a security program, risks can be quantified in money. The following formulas can aid in quantifying risks:

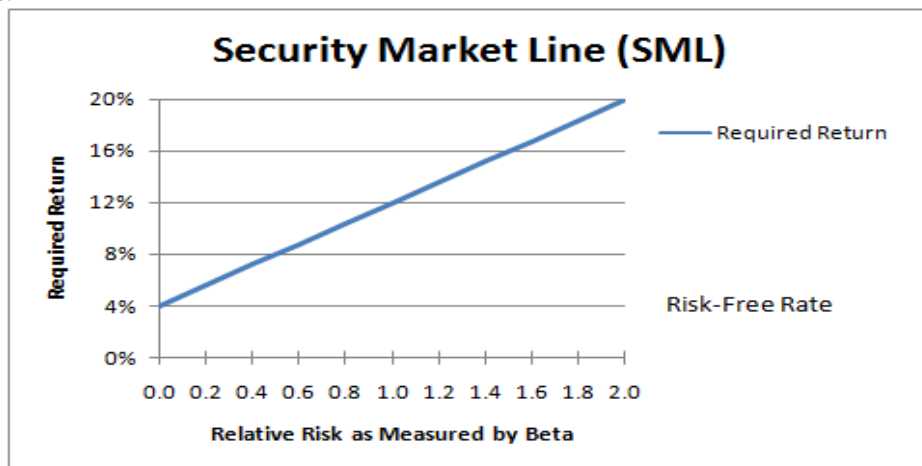
1. *Single Loss Expectancy (SLE) = asset value x Exposure Factor (EF).*
2. *Annualized Loss Expectancy (ALE) = SLE x Annualized Rate of Occurrence (ARO).*

4. What is Security Market Line? (2009)

The line which shows the relationship between expected return and systematic risk is called security market line (SML). The purpose of this line is to show the relationship between risk and return.

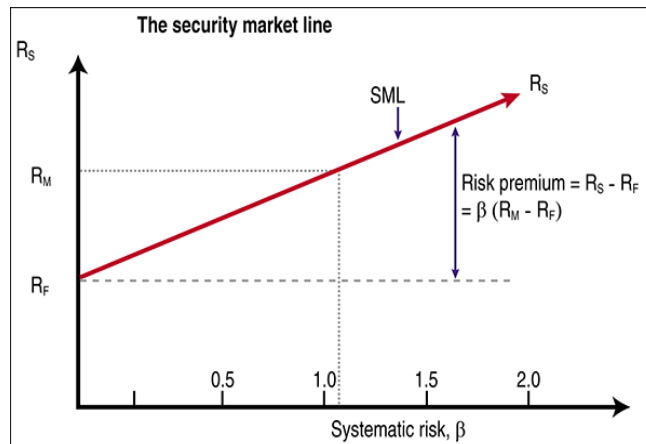
When the relative risk premium, represented by beta, is plotted in a graph against the required return, it yields a straight line known as the **security market line (SML)**. This line begins at the risk-free rate and rises with beta.

A graph of a security market line, assuming a market return of 12% and a risk-free rate of 4%. Note that a beta of 0 is equal to the risk-free rate while a beta of 1 has a relative risk equal to the market.



5. Why SML is straight line? (2008)

SML shows the relationship between expected return and systematic risk. The slope of SML is straight because this line is used to find out highest possible rate of return for a given level of risk.



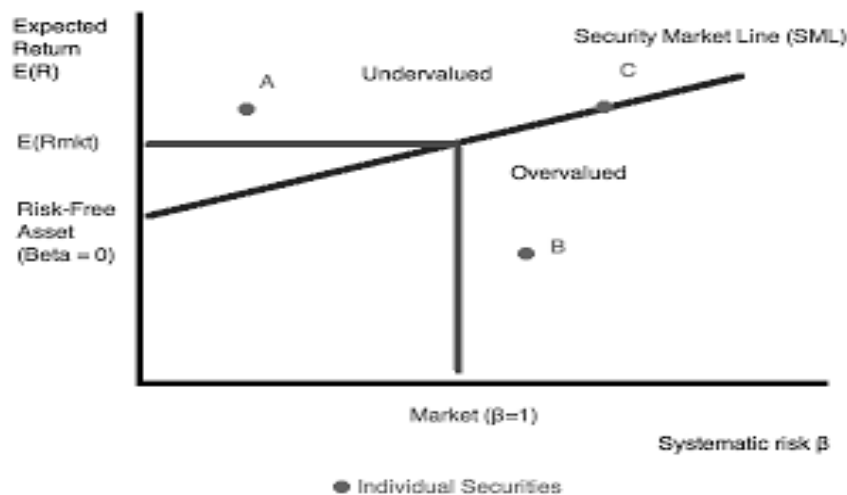
6. What is the significance of Security Market Line? (2009)

A line that graphs the systematic, or market, risk versus return of the whole market at a certain time and shows all risky marketable securities. It is called “characteristic line”.

The SML essentially graphs the results from the capital asset pricing model (CAPM) formula. The x-axis represents the risk (beta), and the y-axis represents the expected return. The market risk premium is determined from the slope of the SML.

The security market line can be used to determine whether an asset is profitable at a give risk or not.

Securities can be plotted on the SML graph. If the security’s risk versus expected return is plotted above the SML, it is considered to be undervalued since the investor expects a greater return for the given risk. A security below the SML is considered to be overvalued because the investor would be accepting less return for the amount of risk assumed.



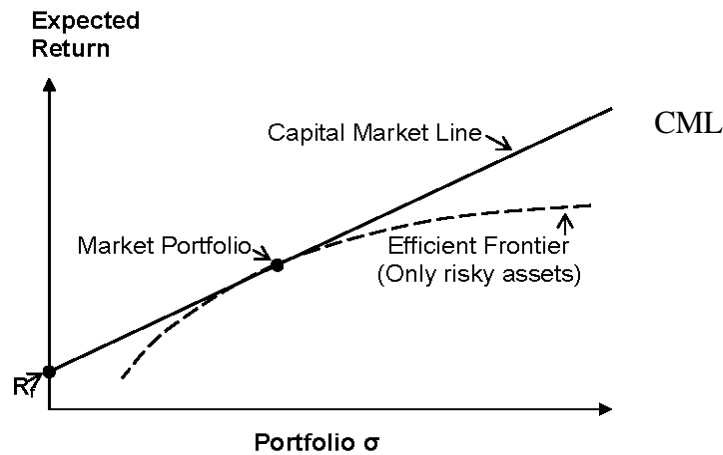
Or. What is the significance of Security Market Line?

A line that graphs the systematic, or market, risk versus return of the whole market at a certain time and shows all risky marketable securities. Also referred to as the characteristic line. The SML essentially graphs the results from the capital asset pricing model (CAPM) formula.

The x-axis represents the risk (beta), and the y-axis represents the expected return. The market risk premium is determined from the slope of the SML.

7. What is capital Market line?

Capital market line: The capital market line (CML) is a line used in the capital asset pricing model to illustrate the rates of return for efficient portfolios depending on the risk-free rate of return and the level of risk (standard deviation) for a particular portfolio.



8. What risk does beta measure? How can you find the beta of a portfolio? (2011)

Beta measures the systematic risk of an asset. It is indicated by β . It is an index of the degree of movement of an asset's return in response to a change in the market return. The market return is the return on the market portfolio of all traded securities. The DSE all shares price index is used as a market return. The value of market beta is generally 1. When the beta of a security is greater than market beta, it will be riskier than market and vice-versa.

We can measure the portfolio beta by the following formula.

$$\beta_p = \sum W_i \times \beta_i$$

Where,

β_p = Portfolio beta.

W_i = Weight of individual security in the portfolio

β_i = Beta of individual security in the portfolio.

Portfolio - X	Weight	.40	.30	.30
	Beta	.90	.95	1
Portfolio- Y	Weight	.45	.25	.30
	Beta	.95	1	1.2

We know,

$$\beta_p = \sum W_i \times \beta_i$$

$$\beta_{pX} = (.40 \times .90) + (.30 \times .95) + (.30 \times 1)$$

$$= .95$$

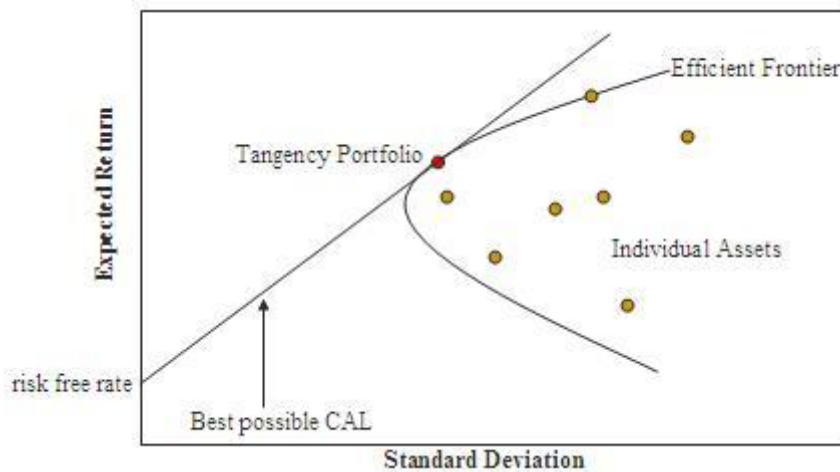
$$\beta_{py} = (.45 \times .95) + (.25 \times 1) + (.30 \times 1.2)$$

$$= 1.04$$

Portfolio Y is more risky than the portfolio X because it has higher portfolio beta than portfolio X.

9. What is the efficient frontier/limit/boundary? How an investor chose his/her optimal portfolio from among the efficient set? (2013, 2012,2011,2008,2007) Or. How can selection of optimal portfolio be measured? (2009)

An efficient portfolio is either a portfolio that offers the highest expected return for a given level of risk, or one with the lowest level of risk for a given expected return. The risk and expected return relationship of efficient portfolios is graphically represented by a curve known as the efficient frontier. The line that connects all these efficient portfolios is the efficient frontier.



Investor can identify **optimal portfolio among the efficient set, where** efficient frontier is connected with capital market line. **And that point gives the** highest expected return for a given level of risk, or one with the lowest level of risk for a given expected return.

10. Define Discounted Cash-flow analysis.

A valuation method used to estimate the attractiveness of an investment opportunity. Discounted cash flow (DCF) analysis uses future free cash flow projections and discounts them (most often using the weighted average cost of capital) to arrive at a present value, which is used to evaluate the potential for investment. If the value arrived at through DCF analysis is higher than the current cost of the investment, the opportunity may be a good one. Calculated as: $DCF = \frac{CF}{1+r} + \frac{CF}{(1+r)^2} + \dots$ CF = Cash Flow; r = Discount rate (WACC).