Important Investment Concepts

Session Outline

Topics to be Covered

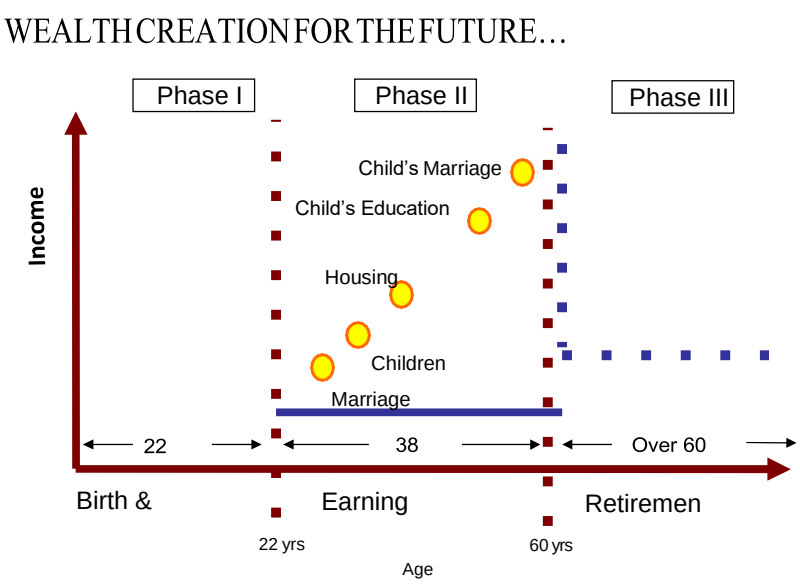
- Investment Objectives
- The Returns and Risk from Investing
- Expected Returns and Risk from
- Beta Versus Standard Deviation
- Market Efficiency

Investment Objectives

Manage Portfolio or…

Plan to finance the needs….

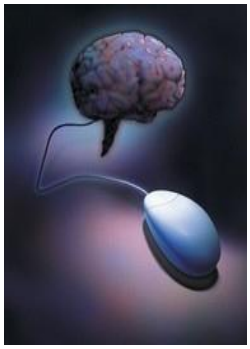
What are those needs?



More Modern Needs

- Longer Retirement Life
- Higher Medical Costs
- Improved Standard of Living
- Vacations Abroad
- Visit Abroad to meet the studying child
- Club Membership
- Second Car

And more….



Wealth Creation is NOT a
TRANSACTION
oriented business

It is a
PROCESS
oriented business

Wealth Creation Process

Need Analysis

Evaluate Person Specific Situation

Define Objectives

Analyse Earnings

Determine Time Frame

Risk Profiling

Portfolio Construction

Asset Allocation

Choice of Products

Profit Booking

Taxation Issues

Regular Review

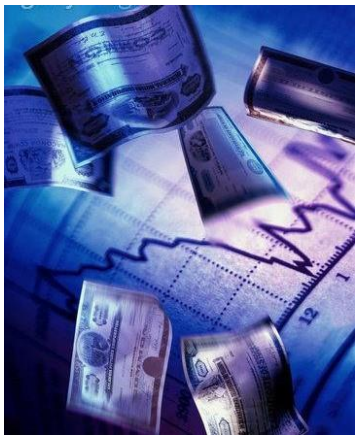
Investments have come a long way today

From traditional investments in precious metals and stones

To Real Estate

To Savings accounts and Fixed deposits

To Stocks & Commodities



Changing Face Of The Economy

1970-1995	1995-2020
Insulated Economy	Opening up of Economy
High Inflation	Low Inflation
High Fixed Return	Emerging Investment instrument of variable return
Investing in Stock Directly	Investing in Stock through MFs Different Mechanism
Technology – No Role	Technology – A Must

Customer : Behavioral Pattern

Yester Years	Current Scenario
Inherited Lifestyle	Independent Lifestyle
Immediate need	Distant needs
Save more	Spend more
Family to support	Savings to support
'Borrowing' a stigma	'Borrowing' is prudent
Less cash carrying	More money in wallet
Fixed pay	Variable pay
Defined benefits	Defined contribution

How Did Investment Scene Undergo Change?

Yester Years	Current scenario
War on prices	War on solutions
Tax Oriented savings	Growth Oriented savings
Invest one time	Regular Investments
Fixed Income	Variable Returns
Deferred benefits	ESOPs, Sweat Equity

Investors today are faced with a wide range of investment options

Stock Markets

PPF

RBI Bonds

Art

Fixed Deposits

PO Schemes

Gold/Commodity

Real Estate

They need Professional HELP!

Portfolio Management helps you learn simple steps to make your money work for you and for your client

Principle # 1 Equity Investing

Equity investments over a period of time create wealth.

"You can be young without money, but
you can't be old without it"
-- Tennesse Williams

5% - 10% equity exposure helps in providing above average returns to beat the inflation and taxation consistently.

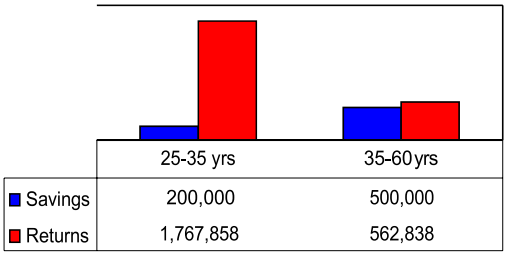
Quantum of Equity in the portfolio have an impact on the results and not a mere exposure in equities. Criteria is " Tenure of Money" and " Tolerance for volatility"

Let's try becoming WARREN BUFFET !

Principle # 2 Start Investing Early – The Power of Compounding

Aakash and Gagan start investing Rs.2,000 every year. Aakash begins at age 25, keeps investing for 10 years and stops at age 35 (but does not withdraw his investment). Gagan, on the other hand, starts investing from age 35 and continues for the next 25 years till he reaches age 60. Guess who gets more money? (assuming both investments earn a compounded return of 15% per annum).

Aakash



	25-35 yrs	35-60 yrs
Savings	200,000	500,000
Returns	1,767,858	562,838

Gagan

The Cost of Delay is huge!

Principle # 3 What are your Financial Goals?

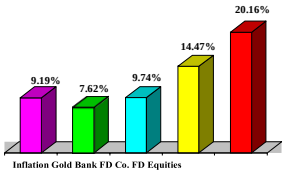
	You need Rs. 50 lakhs now?					
	If your investment earns you 12% annually			If your investment earns you 15% annually		
	Cost of goals *	Investment required ~	Savings #	Cost of goals *	Investment required ~	Savings #
5 yrs	76,93,120	43,65,283	94,855	76,93,120	38,24,840	88,080
10 yrs	118,36,818	38,11,139	52,834	118,36,818	29,25,880	45,004
20 yrs	280,22,054	29,04,956	30,463	280,22,054	17,12,155	21,116
30 yrs	663,38,392	22,14,238	21,532	663,38,392	10,01,912	11,779

** Cost of goals assumes inflation at 9%*
~ Lump sum investment required now
 # Monthly savings to reach these goals

Wealth Manager's Toolkit: MS Excel

Principle # 4 Beat the Inflation

Investment Performance



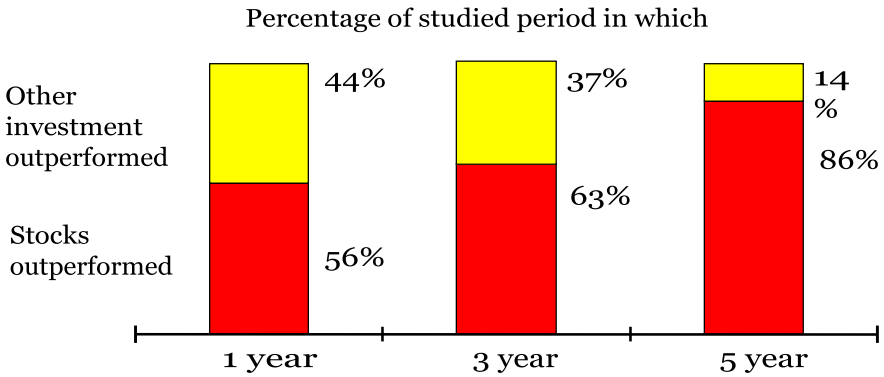
Source :RBI Report on Currency and Finance (1997-2020) BSE Sensitive Index of Equity Prices - BSE

Role Play: Why Equity is Good?

Principle # 5 Think long Term

Equities are the Best Long-Term Bet

Stocks outperform over time



Source : RBI Report on Currency and Finance (1997-2020) BSE Sensitive Index of Equity Prices - BSE

Case Study: RelianceIndustries

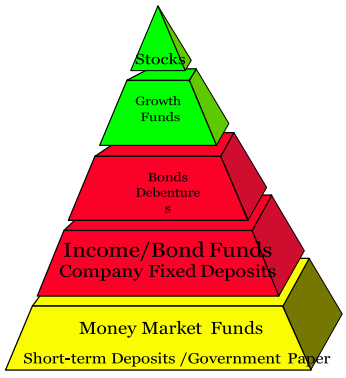
Principle # 6 Asset allocation is the key

Investment Pyramid

Capital Growth
Risk: Medium to High
Period: 5 to 35 years

Income
Risk: Medium to Low
Period: 1 to 5 years

Capital Preservation
Risk: Low to Medium
Period: Less than 1 year



A Model Investment Portfolio!

Principle # 7 Protect your WEALTH

Most Important, what ever may be the choice of your portfolio do not forget that losing money is far more easy than earning money. Safety and not excessive greed, should always be the binding principle to hold your portfolio together.

"You can be young without money,
but you can't be old without it"
-- Tennesse Williams

Case Study: Hedging with Derivatives

Principle # 8 Protect your LIFE & EARNING POTENTIAL

We live in an uncertain world. Our financial plans can go awry because one can never anticipate when tragedy will strike, whether it's a car accident or a debilitating illness. The occurrence of any adverse event means that one's wealth will be eroded (by way of extra-ordinary expenses for medical care) or further anticipated increases will be disrupted (through loss of income due to disability or death of the prime earner). We should, therefore, be aware of the range of significant risks to our financial well-being and should take steps to adequately and properly protect from the loss that could result from those risk.

Introducing: Insurance Planning

Principle # 9 Protect maintaining your LIFESTYLE

Retirement is an important phase of life. It is a time when the active income stops coming in and expenses like medical and health care start rising. While living a long life is considered good, what is more important is that life should be long as well as comfortable. A long life with financial hardships would feel like an eternity.

HDFC STANDARD LIFE
Sar Utha Ke Jiyo

Introducing: Retirement Planning

Principle # 10 Live your LIFE Smartly

It is important to use your wealth wisely and save it wherever possible. This can be done by planning your taxes. Finally, it is also important that you distribute the wealth that you have accumulated in your lifetime by doing estate planning. Living your LIFE smartly, will ensure that your wealth is passed on to your family without delay and distributed as per your wishes. Remember, *it's not how much you have earned in your life – but how much you have saved* is going to make all the difference.

Introducing: Tax & Estate Planning

Returns and Risk from Investing

Higher the RISK…

Mean and Standard Deviation

Calculation of Mean and Standard Deviation

Lets say a Mutual Fund has given returns of 18%, 20%, 14%, 17% and 11% in the last 5 years.

Mean = $\mu = \frac{\sum x}{n}$ where, x is returns and n is the number of years.

So, $\mu = \frac{18 + 20 + 14 + 17 + 11}{5} = 16\%$ (This is also called Arithmetic Mean)

Standard Deviation = $\sigma = \sqrt{\frac{\sum (X - \mu)^2}{N}}$

So, $\sigma = \sqrt{\frac{(18-16)^2 + (20-16)^2 + (14-16)^2 + (17-16)^2 + (11-16)^2}{5}}$ $\sigma = 3.5355\%$

Median and Mode

Median

The median is the midpoint of a data set when the data is arranged in ascending or descending order. Half the observations lie below the median and half lie above.

Median is important because the arithmetic mean can be affected by extremely small or large values (outliers), while the median is not affected by extreme outlier.

Example: Odd number of observations
What is the median return for five senior portfolio managers with 15-year annualized total returns of: 33%, 18%, 25%, 23%, and 21%?

Answer:
First, arrange the returns in descending order,

33%, 25%, 23%, 21%, 18%
For the given data set, the third observation, 23%, is the median value.

Median and Mode

Median

Example: Even number of observations
Suppose we add another manager to the previous example, i.e sixth manager with a return of 28%. What is the median return?

Answer:
Arranging the returns in descending order gives us:

33%, 28%, 25%, 23%, 21%, 18%
With an even number of observations, there is no single middle value.
The median value in this case is the arithmetic mean of the two middle observations, 25% and 23%. Thus, the median return for the six managers is 24.0% = (25 + 23)/2

The mean of 1, 3, 4 and 52 = 15 and the median = 3.5.
If the data were 1, 3, 4 and 6 instead, the arithmetic mean and median would both be 3.5.

Median and Mode

Mode

The mode is the value that occurs most frequently in a data set. A data set may have more than one mode or even no mode.

Example:
What is the mode of the following data set?

Data set: [25%, 28%, 20%, 25%, 28%, 25%, 15%, 18%, 5% 25%]

Answer:

The mode is 25% because it is the value appearing most frequently.

When a distribution has one value that appears most frequently, it is called unimodal. When a set of data has two or three values that occur most frequently, it is said to be bimodal or trimodal, respectively.

The Returns & risks from Investing

The Components Of Return

Yield: The Income Of a security's return.

Capital Gain (Loss): The change in price on a security over some period of time.

Total Return=Yield + Price Change

Where: the yield component can be 0 or + the price change component can be 0,+ or -.

Measuring Returns

Total Return (TR)

Percentage measure relating all cash flows on a security of a given time period to its purchase price.
The general equation for calculating TR is:

$$TR = \frac{CFt + (PE - PB)}{PB}$$
$$= \frac{CFt + PC}{PB}$$

Where :

CFt = cash flows during the measurement period t

PE = price at the end of period t or sale price

PB= purchase price of the asset or price at the beginning of the period.

PC= change in price during the period, or PE minus PB.

Return Relative (RR)

The total return for an investment for a given time period stated on the basis of 1.0.

$$\text{Return Relative} = RR = \frac{CFt + PE}{PB}$$

INFLATION- ADJUSTED RETURNS

$$TRIA = \frac{1 + TR}{1 - IF} - 1$$

Where,

TRIA= the inflation- adjusted total return IF= the rate of inflation

TR & RR Calculation

I. Bond TR $= \frac{IT + (PE-PB)}{PB}$

$= \frac{IT + PC}{PB}$

where, IT= the interest payment (s) received during the period.

Ex: Assume the purchase of a 10% coupon Treasury bond at a price of Rs. 960, held one year, and sold for Rs.1,020. The TR is,

Bond TR $= \frac{100+(1020-960)}{960}$

$= \frac{100+60}{960}$

$= 0.1667$ OR 16.67%

Bond RR $= \frac{100+1020}{960}$

$= 1.1667$

Note: To convert from a return relative (RR) to a TR, subtract 1.0 from the return relative.

TR & RR Calculations

II. Stock TR $= \frac{DT +(PE-PB)}{PB}$

$= \frac{DT + PC}{PB}$

Where, DT = the dividend(s) paid during the period.

Ex: 100 shares of SAIL are purchased at Rs. 30 per share and sold one year later at Rs. 26 per share. A dividend of Rs.2 per share is paid.

Stock TR $= \frac{2+(26-30)}{30}$

$= \frac{2+(-4)}{30}$

$= -0.0667$ or -6.67%

Stock RR $= \frac{2+26}{30}$

$=0.9333$

TR & RR Calculations

III. Warrant TR $= \frac{Ct + (PE - PB)}{PB}$

$= \frac{Ct + PC}{PB}$

$= \frac{PC}{PB}$

Where , Ct= any cash payment received by the warrant holder during the period.
Because warrants pay no dividends, the only return to an investor from owning a warrant is the change in price during the period.
Ex: Assume the purchase of warrants of 1+ B stock at Rs.3 per share, a holding period of 6 months, and the sale at Rs.3.75 per share.

Warrant TR $= \frac{0+(3.75-3.00)}{3.00}$

$= \frac{0.75}{3.00}$

$= 0.25$ or 25%

Warrant RR $= \frac{3.75}{3.00}$

$= 1.25$

Variance and Weighted Average Return

Calculation of Variance and Weighted Average Return

Lets say a Mutual Fund has given returns of 18%, 20%, 14%, 17% and 11% in the last 5 years.

Variance = σ^2

So, Variance = 3.5355*3.5355 = 12.5

Weighted Average Mean or Weighted Average Return: The return is multiplied with the weights given to each return and then divided by the total of the weights.

Year	Return	Weight	Product
2013	20%	2	40
2014	18%	5	90
2015	21%	3	62
		10	192

Weighted Average = 192/10

19.2%

Expected Value

Expected Value

The expected value is the weighted average of the possible outcomes of a random variable, where the weights are the probabilities that the outcomes will occur.

The mathematical representation for the expected value of random variable

X is: $E(X) = \sum P(x_i)x_i = P(x_1)x_1 + P(x_2)x_2 + \ldots + P(x_n)x_n$

Example: The expected value of the roll of a fair dice, where X = number that faces up on the dice, is:

$E(X) = \sum P(x_i)x_i = (1/6)(1) + (1/6)(2) + (1/6)(3) + (1/6)(4) + (1/6)(5) + (1/6)(6)$ $E(X) = 3.5$

Over the long term, 3.5 should be the average value of all outcomes.

Expected Value

Expected Value - Example

The probability distribution of EPS for Glory Stores is given in the table below. Calculate
the expected earnings per share.

Probability $P(x_i)$	Earnings per share (x_i)	$P(x_i)\ x_i$
10%	$2.9	0.29
20%	$2.6	0.52
40%	$2.4	0.96
30%	$2.0	0.60
100%	E[X] = 2.37	

The expected EPS is simply a weighted average of each possible EPS, where the weights
are the probabilities of each possible outcome.

Statistics for Returns

Apart from the measures of returns for a specified period of time, investment analysis also need statistics to describe a series of returns. e.g., investing in a particular stock for 10 years or a different stock in each of 10 years could result in 10 TRs, which must be described by one or more statistics.

Arithmetic Mean return measure of the central tendency of a distribution consisting of returns calculated for a particular time period, such as 10 years. The arithmetic mean, customarily

designated by the symbol $\bar{X}$ (X-bar), of a set of values is

$$\bar{X} = \frac{\sum X}{n}$$

The sum of each of the values being considered divided by the total number of values n.

Geometric Mean

Geometric Mean return measures the compound rate of growth over time. The geometric mean is defined as the nth root of the product resulting from multiplying a series of return relatives together,

$$G = [(1+TR1)(1+TR2) \ldots\ldots\ldots\ldots (1+TRn)]1/n-1$$

where, TR is a series of total returns in decimal form.

Note: Adding 1.0 to each total return produces a return relative. Return Relatives are used in calculating geometric mean returns, because TRs, which can be negative, cannot be used.

Calculation Of Arithmetic Mean And Geometric Mean

Unitech Ltd. Data

	(1)	(2)		
Year(+)	End-of-year Price(P+)	Calendar year Dividends(D+)	TR (X%)	(1+r)
1	Rs.74.60	Rs.2.88	-	-
2	64.30	3.44	-9.2%	0.908
3	67.70	3.44	10.6%	1.106
4	56.70	3.44	-11.2%	0.888
5	96.25	3.44	75.8%	1.758
6	122.00	3.71	30.6%	1.306
			96.6	

The arithmetic mean of the total return for unitech:

$\frac{\sum(TR\%)}{N} = \frac{96.6}{5} = 19.32\%$

The Geometric Mean is:

$[(1+r1)(1+r2) \ldots\ldots\ldots\ldots (1+rn)]1/n - 1$

i.e., GM $= [(0.908)(1.106)(0.888)(1.758)(1.306)]1/5 - 1$

$= (2.047462654)1/5 - 1$

$= 1.1541-1$

$= 0.1541$ OR 15.41%

Arithmetic Mean Versus Geometric Mean

When should we use the arithmetic mean and when should we use the geometric mean to describe the returns from financial assets?
The answer depends on the investor's objective:

* The arithmetic mean is a better measure of average(typical) performance over single periods. It is the best estimate of the expected return for next period.
* The geometric mean is a better measure of the change in wealth over time(multiple periods). It measures the realized compound rate of return at which money grew over a specified period.

Ex: The Effects Of Reinvesting Returns:
The difference in meaning of the arithmetic and geometric mean, holding unitech stock over the 6 year period for two different investment strategies, is as follows:

Strategy A- keep a fixed amount(say, Rs.1000) invested and do not reinvest returns.

Year	Amount Invested(X)	X * r1	Return
1	Rs.1000	-0.092	-Rs.92.00
2	1000	0.106	106.00
3	1000	-0.112	-112.00
4	1000	0.758	758.00
5	1000	0.306	306.00
6	1000		
Total			Rs.966.00

Using strategy A, keeping Rs.1000, invested at the beginning of the year, total returns for the years 1-6 were Rs.966, or Rs.193.20 per year average (Rs.966/5), which on a Rs.1000 = 0.1932, or 19.32% per year- the same value as the arithmetic mean demonstrate problem earlier.

Strategy B - reinvest returns and allow compounding

Year	Amount Invested(X)	X * (1+rt)	Terminal Amount
1	Rs.1000	0.908	Rs.908.00
2	908.00	1.106	1004.25
3	1004.25	0.888	891.77
4	891.77	1.758	1567.74
5	1567.74	1.306	2047.46
6	2047.46		

Using Strategy B, compounding gains and loses, total return was Rs. 1047.46(the terminal amount Rs.2047.46 minus the initial Rs.1000). The average annual rate of return in this situation can be found by taking the nth root of the terminal/initial amount:

$[2047.46/1000]1/5 = (2.04746)1/5$

$= 1.1541 = (1+r),$

$r\% = 15.41\%$

Which is exactly the set of values we ended up with in demonstrated problem when calculating the geometric mean.

Risk

Risk is defined as the chance that the actual outcome from an investment will differ from the expected outcome.

Types Of Risk

The total risk is divided into two components, a general(market) component and a specific(issuer) component, we have systematic risk and non-systematic risk, which are additive:

Total Risk = General risk+ Specific risk
= Market risk+ Issuer risk
= Systematic risk+ Non-systematic risk

Systematic(Market) Risk are risks attributable to broad macro factors affecting all securities.

Sources: Interest Rate Risk, Market Risk, Inflation Risk, Exchange Rate Risk & Country Risk.

Non-systematic(Non-market) Risk are risks attributable to factors unique to a security.

Sources: Business Risk, Financial Risk & Liquidity Risk.

Variance and Standard Deviation

Variance and Standard Deviation – EPS Example

$\text{Variance} = \sigma^2(X) = \sum P(x_i)[x_i - E(X)]^2$

Probability	Earnings per share	$[x_i - E(X)]^2$	$P(x_i)[x_i - E(X)]^2$
10%	\$2.9	$(2.90 - 2.37)^2 = 0.2809$	0.02809
20%	\$2.6	$(2.60 - 2.37)^2 = 0.0529$	0.01058
40%	\$2.4	$(2.40 - 2.37)^2 = 0.0009$	0.00036
30%	\$2.0	$(2.0 - 2.37)^2 = 0.1369$	0.04107
100%	E[EPS] = 2.37		$\sigma^2 = 0.0801$

V

$2.37)^2 =$
0.0801

The standard deviation of EPS for Glory Stores is: $\sigma EPS = (0.0801)^{1/2} = 0.2830$

Note that the units of standard deviation are the same as that of EPS, so we

Covariance and Correlation

Covariance

Covariance is a measure of how two assets move together. A common symbol for the covariance between random variables *X* and *Y* is Cov(X,Y).

- The covariance is a general representation of the same concept as the variance. i.e. The variance measures how a random variable moves with itself, and the covariance measures how one random variable moves with another random variable.
- The covariance of Returns on an asset, R_A with itself is equal to the variance of R_A; that is, $Cov(R_A,R_A) = Var(R_A)$.
- The covariance values may range from negative infinity to positive infinity, thus covariance is difficult to interpret. Also like the variance, these values are expressed in terms of square units.

Covariance and Correlation

Correlation

Correlation or also called correlation coefficient is a standardized measure of a linear relationship between two variables.

$$\text{Corr}(R_x,R_y) = \frac{\text{Cov}(R_x,R_y)}{\sigma(R_x)\,\sigma(R_y)}$$

$$\text{Cov}(R_x,R_y) = \text{Corr}(R_x,R_y)\,\sigma(R_x)\,\sigma(R_y)$$

The correlation may also be expressed as $\rho(R_x,R_y)$ or $\rho_{x,y}$

It has no units and its values range from -1 to +1. i.e. $-1 \le \text{Corr}(R_x,R_y) \le +1$.

- If $\text{Corr}(R_x,R_y) = 1.0$, the random variables have perfect positive correlation. This means that a movement in one random variable results in a proportional positive movement in the other relative to its mean.
- If $\text{Corr}(R_x,R_y) = -1.0$, the random variables have perfect negative correlation. This means that a movement in one random variable results in an exact opposite proportional movement in the other relative to its mean.
- If $\text{Corr}(R_x,R_y) = 0$, there is no linear relationship between the variables, indicating that prediction of R_x cannot be made on the basis of R_y using linear methods.

Covariance and Correlation

Correlation - Example

Compute and interpret the correlation of the returns for stock A and B, given that $\sigma^2(R_A) = 0.0028$ and $\sigma^2(R_B) = 0.0124$ and that $\text{Cov}(R_A, R_B) = 0.0036$.

Answer:

$$\text{Corr}(R_x,R_y) = \frac{\text{Cov}(R_x,R_y)}{\sigma(R_x)\,\sigma(R_y)}$$

First, it is necessary to convert the variances to standard deviations.

$\sigma(R_A) = (0.0028)^{1/2} = 0.0529$

$\sigma(R_B) = (0.0124)^{1/2} = 0.1114$

$$\text{Corr}(R_A, R_B) = \frac{0.0036}{(0.0529)(0.1114)} = 0.6108$$

The fact that this value is close to +1 it indicates that there is a strong positive relationship between stock A and B.

Understanding Beta

Beta

- The equation of CAPM

  $E(R_i) = R_f + \beta_i [E(R_m) - R_f]$
- It fits nicely with the CML, defined as

  $E(R_p) = R_f + (\sigma_i/\sigma_m) [E(R_m) - R_f]$

  Where Factor weight $\beta_i = \sigma_i/\sigma_m$

  (as the CML considers a diversified portfolio)
- But the β_i in the CAPM includes an adjustment for the correlation between asset & the market.

Understanding Beta

Beta

Also, $\beta_i = Cov(R_i, R_m)/\sigma_m^2 = \rho_{i,m}\sigma_i\sigma_m/\sigma_m^2 = \rho_{i,m}\sigma_i/\sigma_m$

- +ve β_i □ the R_i moves in the same direction of the market
- –ve β_i □ the R_i moves in the opposite direction of the market

- A $\beta_{Rfr} = 0$ because its covariance with other assets is zero
- Any asset's correlation with itself is 1
- If the correlations among different sectors are high □ companies have similar reactions to the same economic and market changes

Capital Market Theory

Capital Asset Pricing Model (CAPM)

- It is the equilibrium model that underlies all modern financial theory.
- Derived using principles of diversification with simplified assumptions.
- Markowitz, Sharpe, Lintner and Mossin are researchers credited with its development.

Assumptions

- Individual investors are price takers.
- Single-period investment horizon.
- Investments are limited to traded financial assets.
- No taxes and transaction costs.

Assumptions (cont'd)

- Information is costless and available to all investors.
- Investors are rational mean-variance optimizers.
- There are homogeneous expectations.

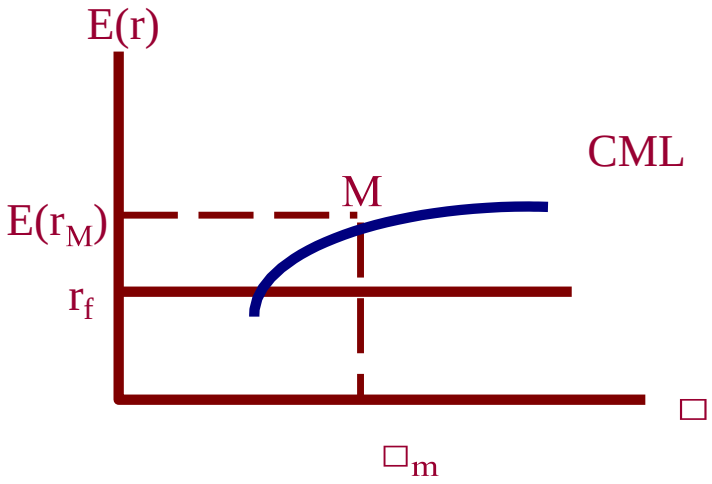
Resulting Equilibrium Conditions

- All investors will hold the same portfolio for risky assets – market portfolio.
- Market portfolio contains all securities and the proportion of each security is its market value as a percentage of total market value.

Resulting Equilibrium Conditions (cont'd)

- Risk premium on the the market depends on the average risk aversion of all market participants.
- Risk premium on an individual security is a function of its covariance with the market.

Capital Market Line



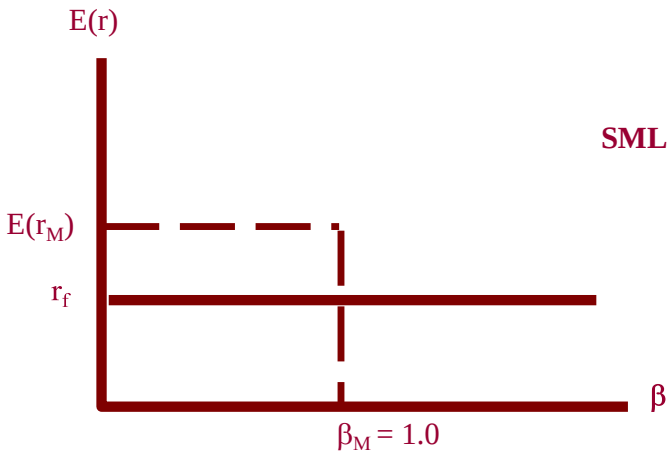
Slope and Market Risk Premium

M	=	Market portfolio
r_f	=	Risk free rate
$E(r_M) - r_f$	=	Market risk premium
$\frac{E(r_M) - r_f}{\square_M}$	=	Market price of risk Slope of the CAPM

Retur and Risk For Individual Securities

- The risk premium on individual securities is a function of the individual security's contribution to the risk of the market portfolio.
- An individual security's risk premium is a function of the covariance of returns with the assets that make up the market portfolio.

Security Market Line



SML Relationships

Beta = $[COV(r_i, r_m)] / \sigma_m^2$

Slope SML = $E(r_m) - r_f$

= market risk premium

$SML = r_f + Beta[E(r_m) - r_f]$

$Beta_m = [Cov(r_i, r_m)] / \sigma_m^2$

$= \sigma_m^2 / \sigma_m^2 = 1$

Sample Calculations for SML

$E(r_m) - r_f = .08$ $r_f = .03$

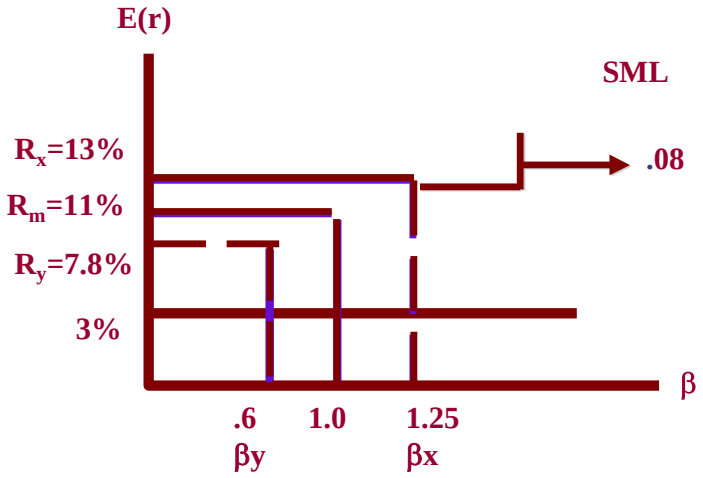
$Beta_x = 1.25$

$E(r_x) = .03 + 1.25(.08) = .13$ or 13%

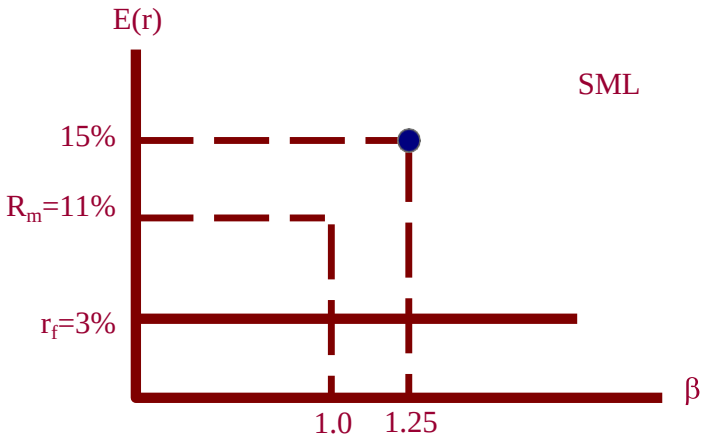
$Beta_y = .6$

$e(r_y) = .03 + .6(.08) = .078$ or 7.8%

Graph of Sample Calculations



Disequilibrium Example



Disequilibrium
Example (cont)

- Suppose a security with a Βετα of 1.25 is offering expected return of 15%.
- According to SML, it should be 13%.
- Under-priced: offering too high of a rate of return for its level of risk.

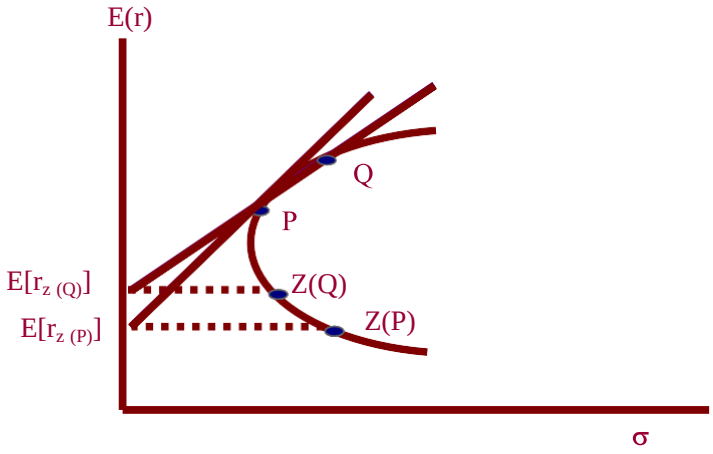
Black's Zero Beta Model

- Absence of a risk-free asset
- Combinations of portfolios on the efficient frontier are efficient.
- All frontier portfolios have companion portfolios that are uncorrelated.
- Returns on individual assets can be expressed as linear combinations of efficient portfolios.

Black's Zero Beta Model Formulation

$$E(r_i) = E(r_Q) + \left[E(r_P) - E(r_Q)\right] \frac{Cov(r_i, r_P) - Cov(r_P, r_Q)}{\sigma_P^2 - Cov(r_P, r_Q)}$$

Efficient Portfolios and Zero Companions



Zero Beta Market Model

$$E(r_i) = E(r_{Z(M)}) + \left[E(r_M) - E(r_{Z(M)})\right]\frac{Cov(r_i, r_M)}{\sigma_M^2}$$

CAPM with $E(r_{z\,(m)})$ replacing r_f

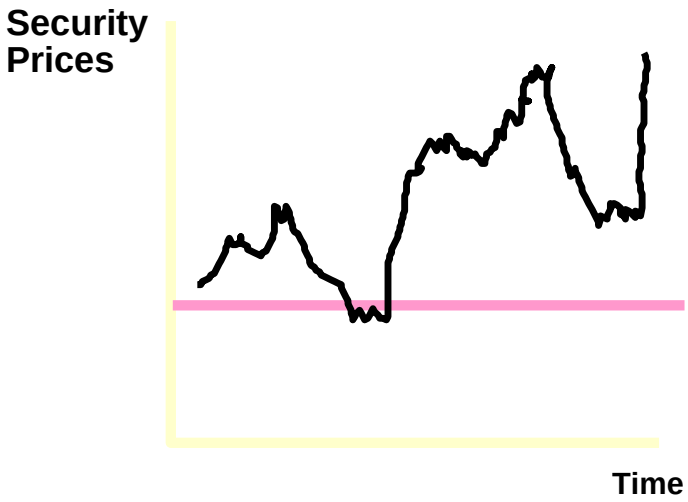
Efficient Markets

Efficient Market Hypothesis (EMH)

Do security prices reflect relevant information fully and immediately?

- What kind of information?
  - Past prices, trading volume, etc Weak form EMH
  - Public information announced Semi-strong EMH
  - Private information of managers Strong EMH
- Competition assures prices to reflect information
  - Once information becomes available, market participants analyze it and trade on it

Random Walk with Positive Trend



Market Efficiency Concepts

Allocation Efficiency
- Does capital flow to the projects with the highest risk-adjusted returns?

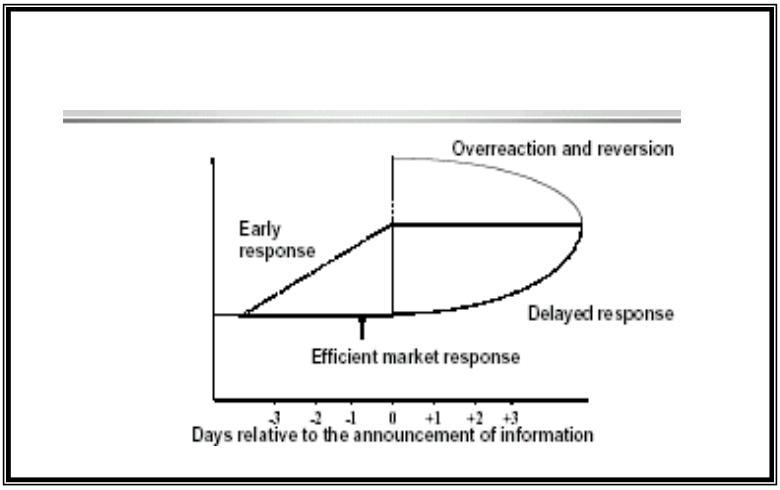
Operational Efficiency
- Are transactions completed on a timely basis, accurately and at low cost?

Informational Efficiency
- Does the observed market price of a security reflect all information relevant to pricing the security?

Theory of Efficient Markets

Financial economics focuses on informational efficiency
- An efficient market is a market that is efficient in processing information
- Prices of securities observed at any point in time are based on a correct evaluation all information available at the time, i.e. prices "fully reflect" all available information
- Also called "Efficient Markets Hypothesis (EMH)"

How Prices Adjust to New Information



Patterns of Market Response

Early Response (anticipated information)
Efficient Markets Response
Delayed Response and Reversion
Overreaction

Why do we need to appreciate EMH?

Fundamental attributes of a capitalist economy
- Prices are accurate signals for capital allocation
- Both issuers and buyers of securities expect fair prices
- Persistence of glaring pricing anomalies erodes market confidence

Any capital markets will not develop unless both issuers and investors believe that securities are fairly priced

Market regulators, policymakers and operators need to focus on improving pricing efficiency

Economic Foundations of the EMH

EMH is an applications the theory of rational expectations to financial markets

A set of postulates are advanced to justify the EMH

- Expectations of future returns are rational, i.e. equal to the optimal forecasts on the basis of the best available information
- On average, the expected return will equal the equilibrium return, i.e. the return based on factors such as risk, liquidity, etc
- Current prices will be set such that the optimal forecast of a security's return using all available information will be equal to the security's equilibrium return
- In an efficient market, all unexploited profit opportunities will be eliminated
- Stock prices follow a "random walk", i.e. future changes in prices should for all practical purposes be unpredictable

Persistence of inefficiency means that investors are not using all information at their disposal in setting security prices, i.e. expectations are not "rational"

Implications for Active or Passive Management

Active Management
- Security analysis
  - Technical analysis → Market timing
  - Fundamental analysis → Stock selection

Passive Management
- Buy and Hold
- Index Funds

Empirical evidence
- Investing in passively managed funds such as index fund has outperformed actively managed funds for the last several decades.
- What does this imply?
  - It is difficult to beat the market consistently over time

Interpreting the EMH

	Meaning #1	Meaning #2
Weak Version	You cannot beat the market by using historical info. on prices and volumes.	Historical price and volume info is reflected in the current price of the stock.
Semi-Strong Version	You cannot beat the market by using any public info.	All Public info. is reflected in the current price of the stock.
Strong Version	You cannot beat the market by using any public or private info.	All public and private info. is reflected in the current price of the stock.

WEAK FORM EMH

- Information Set = All historical security prices
- Implies Price Changes should be random
- $P_t - P_{t-1}$ ~ Normal distribution and not correlated through time

Semi-Strong Form EMH

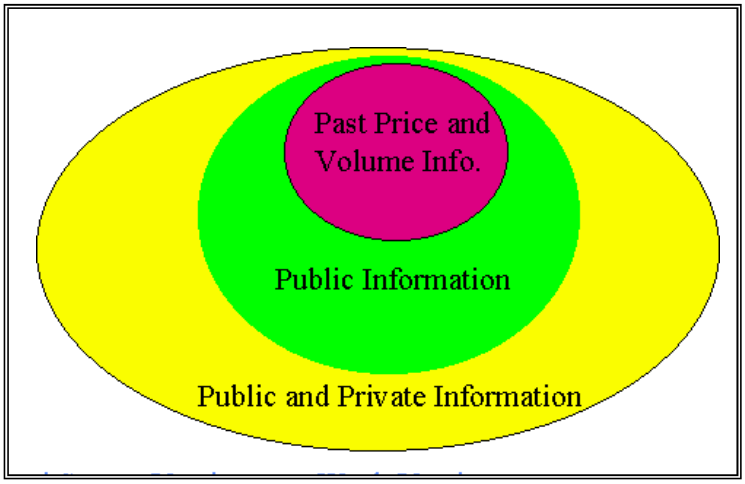
- Information Set = all publicly available information
- Markets should react instantaneously and correctly to new information
- Tested via Event Studies: Stock Splits, Dividend Announcements, etc.

Strong Form EMH

- Information Set = all information both public and private
- Since illegal to trade on inside information, would not expect this to hold
- Difficult to test, not clear when private information becomes available
- "Fully Reflect"
- Means prices adjust via some mechanism: natural choice is CAPM

Abnormal Returns = Actual Returns minus CAPM predicted returns

Efficient Markets and Information Sets



What is the Empirical Evidence?

Whether markets are efficient or indeed can be efficient has not been fully resolved

Extensive testing has taken place in advanced markets

Research on the efficiency of African capital markets is scanty

Tests in Advanced Markets

Tests generally support weak-form efficiency (i.e. past prices cannot be used to predict future prices)

Public information has been found to incorporated into and sometimes even anticipated by prices, therefore markets are strong-form efficient

Few portfolio managers are able to beat the market and do not do so with any consistency

But

- insiders are able to earn above normal returns securities markets are inefficient at the strong-form level

THANK YOU

Please Feel Free to Clarify Your Doubts

Q & A Session

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