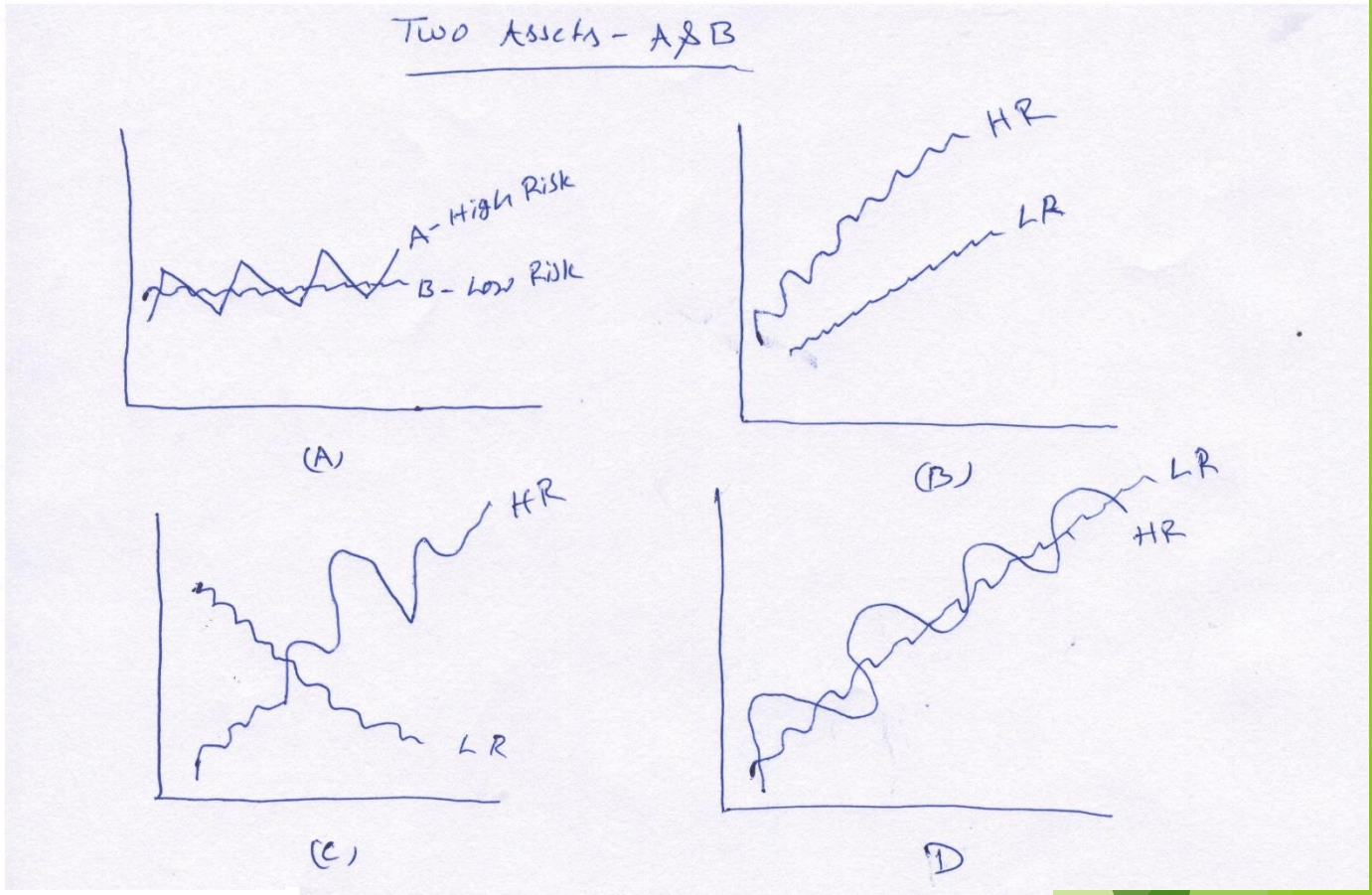
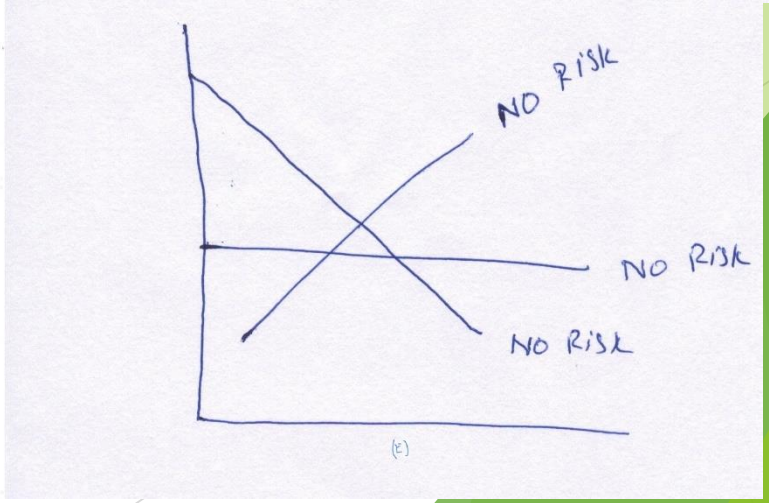
Risk and Return

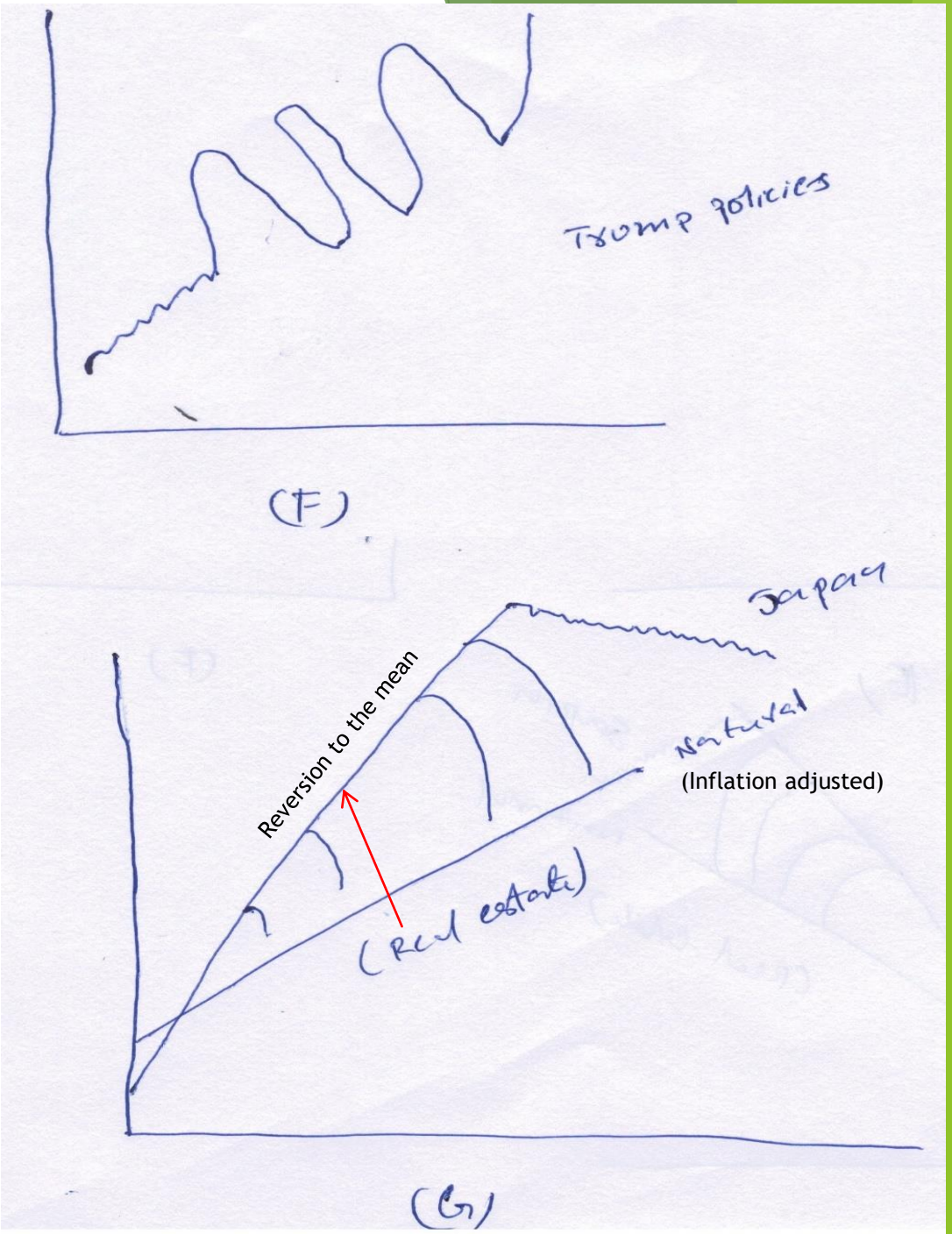
- What is it and how to Measure it?
- Figures explain risk for two assets.
  - Downside Risk- Risk part
  - Upside Risk- Return part
  - Generally people are sensitive to down side risk.
  - But in general we look at the variability in return
- No zero risk in the real world- there are other risks:
  - Inflation Risk
  - Currency Risk
  - PRICE Risk
    - stock
    - bond
    - real estate
    - commodity
      - Rice
      - Oil
      - Gold-a very important commodity of all.
- The higher the zigzag, the higher the risk





Risk and Return (Cont.)

- How is the variability measured??
  - STD (σ)
  - Var (σ^{2})
- For investments: need to look at risk and return
- Risk can change due to various factors(F&G)
  - Trade wars, politics, geopolitics, economy etc.
  - Risk means pain/suffering to the investor



Negative rate of return

- The returns of a stock bought for ₹1000:
- 15%, - 15%, 10%, -10% → average return is 0%⇒ Historical.

₹1000 x 1.15 x 0.85 x 1.10 x 0.90 = ₹ 967.5 ⇒ Compound return

- Period →0 1 2 3 4

- ₹1000 - ₹967.5= ₹32.28 → Negative return!!!
- $Annual\ reurn = \left[\frac{₹967.5}{₹\ 1000}\right]^{\frac{1}{4}} - 1 = = [0.9675]^{\frac{1}{4}} - 1 = -0.0082\ or\ -0.82\%$
- Negative rate of return can be written as:
- Principal/initial investment x (1-r)
  - r = -1%, r = -3%, r = -20%, r = - 50% r = 12% r = -12% ⇒ these can be written as:
  - 0.99, 0.97, 0.8, 0.5 1.12 0.88
- ↑ negative rate of return

Return on a Stock

- Example:
  - Assume we purchased a stock at ₹25 and received ₹2 in dividends during the year. After one year the stock price rose to ₹31. The % of return we got is:
  - Calculation:

$$\text{Percentage Return} = \text{Capital Gains Yield} + \text{Dividend Yield}$$

Percent return = (₹ 31 - ₹ 25)/ ₹ 25 + (₹ 2/ ₹ 25)

= 24% + 8% = **32%**

- Historic vs. Required Returns
  - What actually happened to return…. we call this a “historic” return.
  - Prior to making the investment we may have had an *expected* return of 50%!!
    - In this case…. 32% return fell short of our expectations.
  - Alternatively, our expectations were to earn only 10%!!!.
    - So, the actual return exceeded our expectations.

Risk and Return (Cont.)

- Rate of return is annualised and expressed in percentage.
  - Realised rate of return – actual and historic
  - Required rate of return - compensating risk
  - Expected rate of return – probabilities or average historical returns
- Investments are made with a hope to receive positive returns
- Holding period- investment horizon
- Return will have a distribution
  - Mean – Expected return
  - Variance – Risk
  - When you don't get your expected return …….up/down side????

Risk and Return (Cont.)

- **Realized rate of Return**
  - Purchase Price of House = ₹100 lakh; after one year it is ₹101 lakh
    - ₹100 → ₹101 lakh ⇒ 1 lakh return
  - Additionally, you may have income, ₹2 lakh .
  - Rate of Return (%) = $\frac{(P_t - P_0) + \text{Income}}{P_0}$
  - Income PART:
    - Stock – Dividend
    - Bond – Coupon (interest)
    - Real Asset – Rent
    - Currency (deposit) – Interest
  - If $P_t > P_0$ → Price Appreciation ⇒ paper gain
  - If $P_t < P_0$ → Price Depreciation ⇒ paper loss
  - If sold at P_t and $P_t > P_0$ → capital gain ⇒ realized gain
  - If sold at P_t and $P_t < P_0$ → capital loss ⇒ realized loss

Risk and Return (Cont.)

- **Expected rate of return:**
  - *Average historic returns*
    - Example: $t_1 = 1\%$, $t_2 = 2\%$, $t_3 = 2\%$, $t_4 = 3\%$, $t_5 = 2\%$
    - =10/5 = 2%
  - *Probability* –need to make scenarios. Example: Housing prices/asset prices

Scenario in the Economy (1)	Growth or rate of return (%) if that happens (2)	Probability (%) of that occurring (3)	Product/weighted (4 = 2 X 3)
Great	+7.0	30	2.1%
Good	+5.0	40	2.0%
Bad	+2.0	20	0.4%
Really bad	-4.0	10	-0.4%
		100	4.1% = Expected Rate of Return

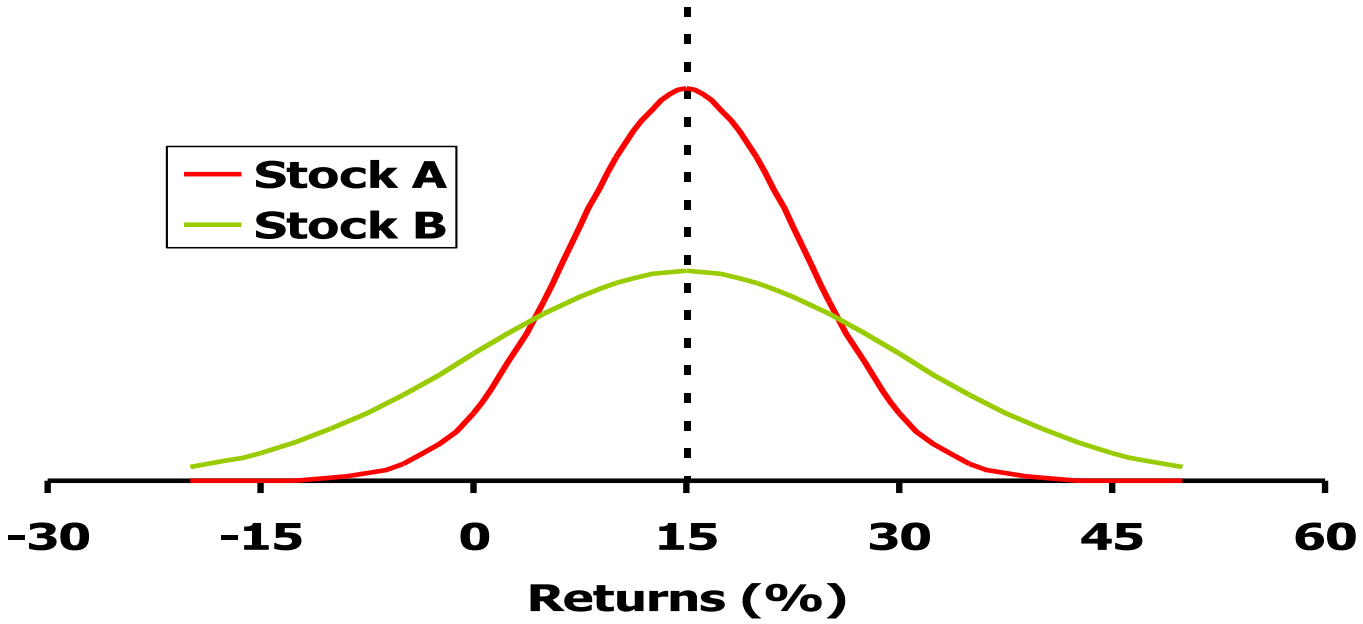
- Thus, expected rate of return$(\hat{r}) = \sum_{i=1}^{N} P_i r_i = P_1 r_1 + P_2 r_2 + \cdots + P_N r_N$
  - where, r_i are the possible returns; the P_i are the associated probabilities; and *N* is the number of outcomes.

Measuring Risk

- What actually happens may differ from what we either expect or would like to happen - *risk*.
- People ’re especially sensitive to the risks related to underperforming our expectations.
- Given a choice between low and high risk assets at 10% return for the both, many prefer to choose low risk asset.
  - Risk is the *variability* in the return.
- A common approach is to look at distributions of historic or projected returns and then Standard deviation or Variance.

Measuring Risk(Cont.)

- The probability distributions of returns for two stocks, A and B. Which stock is riskier?



- If our expected or required return was average of 15% then we can consider Stock A to be less risky as it clusters around mean!!!!
- More importantly, is our preference to avoid bigger (bad) surprises:
  - While both Stocks A and B have an equal chance of falling below our expectations, Stock B will likely fall further from our expected return than Stock A.
- Investors are extra sensitive to lower performance → *The larger the volatility (STD or var.) the greater the risk*.

Measuring Risk (Cont.)

- A reminder of the formulas for variance and standard deviation:
  - σ = Standard deviation
  - σ^2 = Variance

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{t=1}^{N} (\text{Return}_t - \text{Average Return})^2}{\text{N} - 1}}$$

Measuring risk- Example

- Using the following returns, calculate the average return, the variance, and the standard deviation for XYZ stock.

Year	XYZ (%)
1	10
2	4
3	- 8
4	13
5	5

Measuring risk- Example

- **Solution:**
  - Average Return = (10% + 4% -8% + 13% + 5%)/5 = 24/5 = 4.8%
  - How disperse are these returns???
    - $Var(\sigma^{2)} = [(10 - 4.8)^2 + (4 - 4.8)^2 + (-8 - 4.8)^2 + (13 - 4.8)^2 + (5 - 4.8)^2]/5-1$
    - = 258.8/4
    - σ^2 = 64.75% (var)
    - STD (σ) = $\sqrt{var}$ = $\sqrt{64.75\%}$ = 8.04%
  - 8.04% STD is good or bad???
  - Theoretically, two-third of time, an event will fall within +/- one STD of the expected value.
    - So, assuming the expected returns = 15%....
    - The company returns will fall between
      - 6.96% (15 – 8.04) and 23.04 (15 + 8.04) i.e. 15+/-8.04.

Risk and Return(Cont.)

Annual Standard Deviation of Returns for Stocks, Bonds, and T-Bills, 1950 to 2007

	STOCKS	LONG-TERM TREASURY BONDS	T-BILLS
1950 to 2007	17.0%	10.3%	2.8%
1950 to 1959	19.8	4.9	0.8
1960 to 1969	14.4	6.2	1.3
1970 to 1979	19.2	6.8	1.8
1980 to 1989	12.7	15.1	2.6
1990 to 1999	14.2	12.8	1.2
2000 to 2007	16.4	6.7	1.7

Portfolio Risk and Return

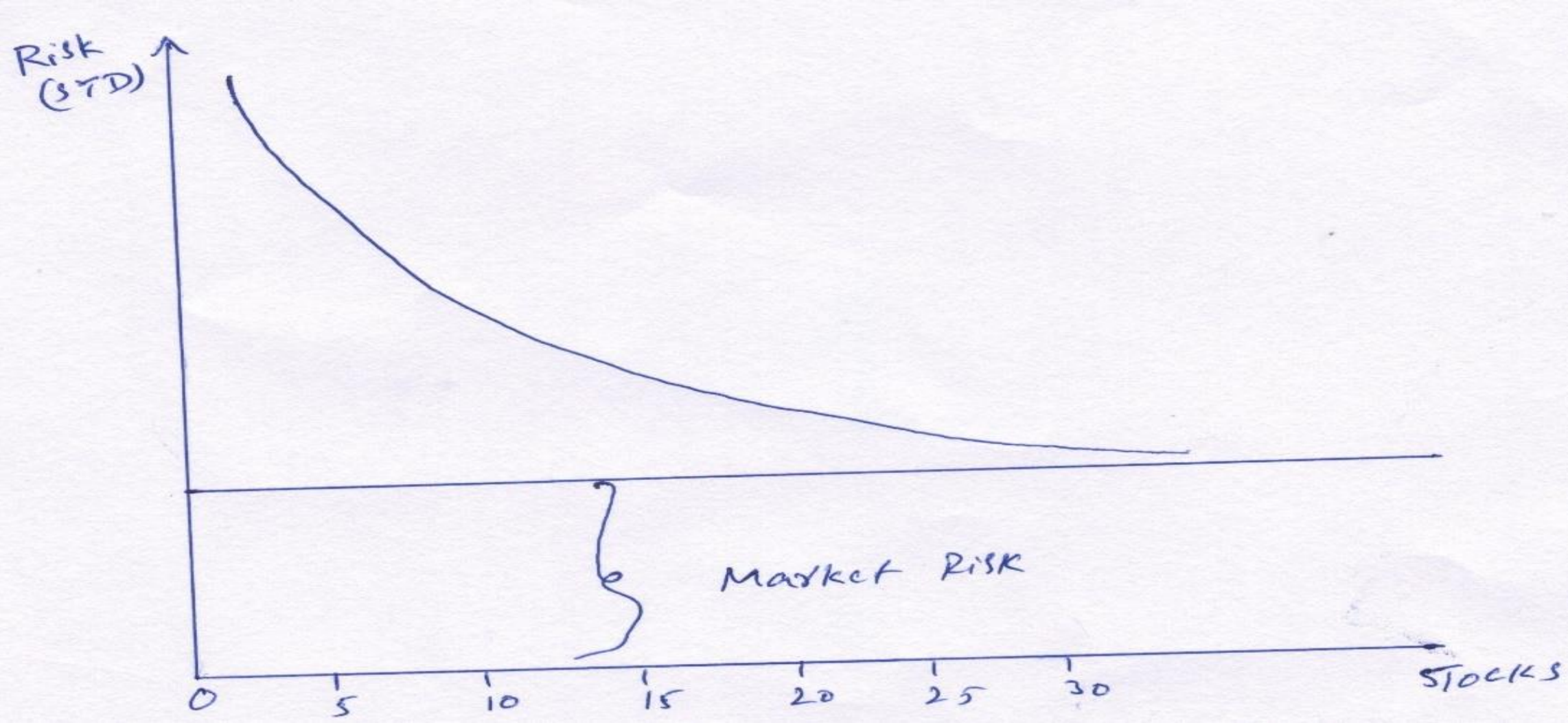
- So higher risks, higher returns. More volatile stocks should have, on average, higher returns.
- Grouping assets into portfolios.
- Portfolio → Diversification → lowering Risk
  - It is a collection of assets or investments.
    - Portfolio of 2 stocks of x or 4 stocks of y and so on.
- This is "diversifying risk".
- *For example*, in a given year a particular pharmaceutical company may fail in getting approval of a new drug, thus causing its stock price to drop.
  - Industry - some are likely to be successful while others will fail ⇒ Thus, less volatile
  - Sector specific level risk ⇐ drug-approval policy ⇒ the entire sector suffer
  - Portfolio comprised of other sectors ⇒ less volatile
  - A market-level portfolio!!! Then the risk will have two components:
    - Firm-specific risk (or asset-specific risk)
    - Market-level risk

Portfolio Return

- *It is the weighted average* of the expected returns of the individual assets in the portfolio, the weights are the % of the total portfolio invested in each asset.
  - *Expected return of portfolio* = $E(r_p) = w_1 . E(r_1) + w_2 . E(r_2) = \sum w_i \, . \sum (r_i) \, .$
- Why diversify?
  - Diversification does not increase return but risk will come down.
  - Adding stocks with same expected return, $E(r_p)$ will be the same but the expected risk will fall.
- Portfolio risk $\rightarrow$ risk of collection of assets;
- Asset risk $\rightarrow$ risk of single asset

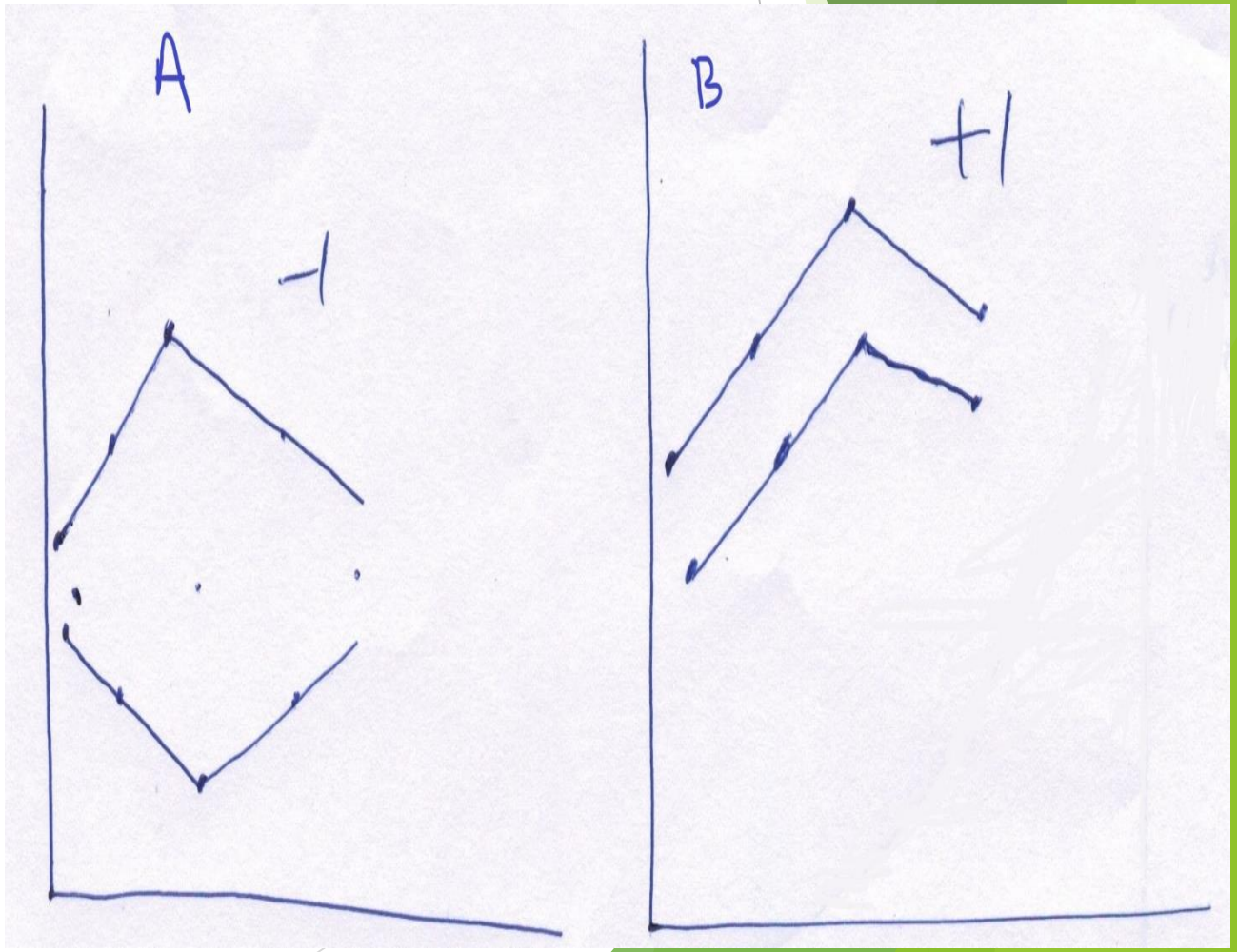
Diversifying Risk: Portfolio

- As we include more stocks in the portfolio the volatility (risk) of returns lessens:



What does diversification depend on??

- When stocks are subject to different kinds of events such that their returns differ over time, i.e. the stock's returns are not perfectly correlated. Their price movements often counteract each other.
- By contrast, if two stocks are perfectly positively correlated, diversification has no effect on risk.
- Diversification driven by correlation.
- Correlation:
  - +1 → no diversification
  - 0.5-0.7(high) → Good ≈
  - 0 → Excellent ≈
  - -1 → Perfect ≈
- Correlation↓ ⇒ Diversification ↑ ⇒ Risk↓



Effect of Diversification

- For two assets case
- Correlation → 0.5 → 20% to 17.5% →12.5%
- Correlation → 0 → 20% to 16 % → 20%
- Correlation → -0.5 → 20% to 10% → 50%
- Correlation → -0.9 → 20% to 4% → 80%

Approximate Risk reduction from 20%

- Correlation of +1 or -1…..which investment??????
  - Stocks will have higher correlation
  - Inclusion of gold in portfolio will be better

Portfolio risk (two assets)

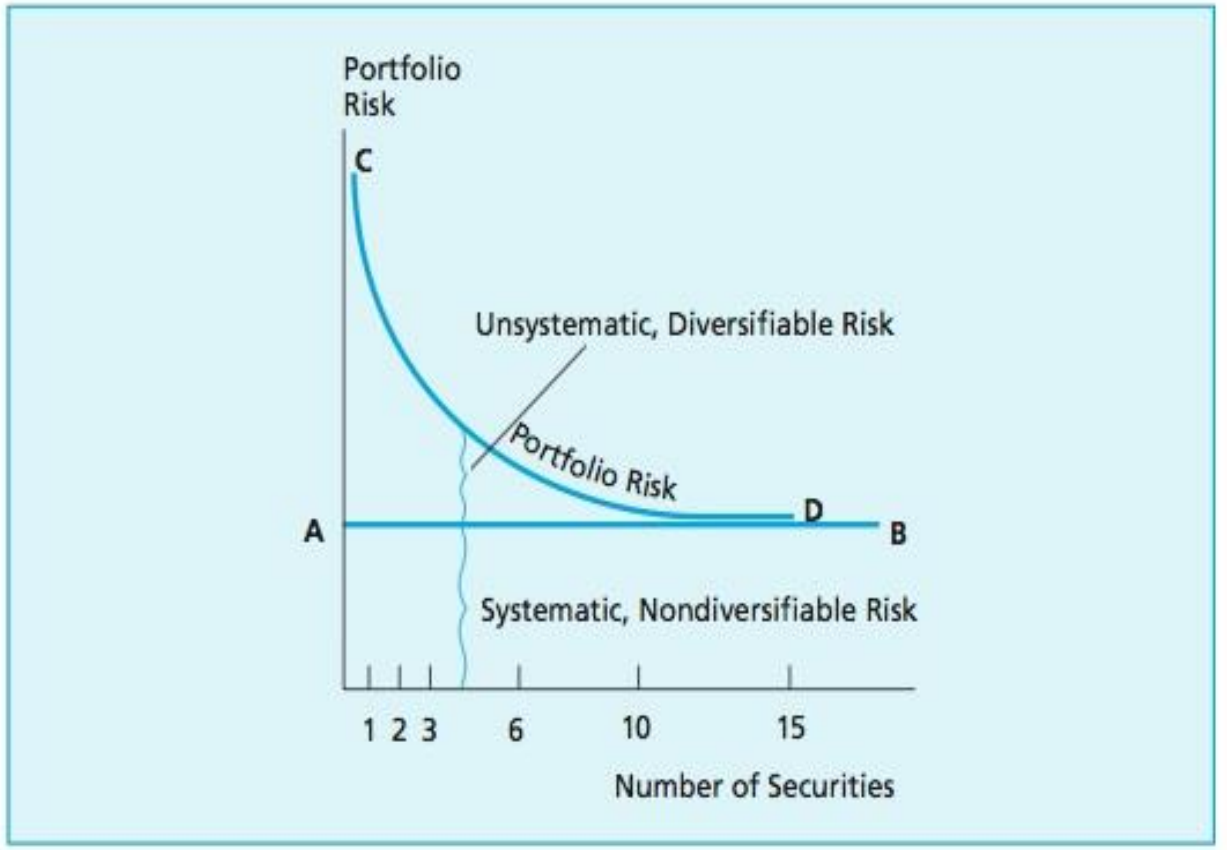
- $\mathrm{VAR}(\sigma_p^2) = w_1^2.\sigma_1^2 + w_2^2.\sigma_2^2 + 2w_1w_2.\sigma_1\sigma_2.Corr_{1,2}$
- $\mathrm{Covariance}_{1,2} = \sigma_1\sigma_2.Corr_{1,2}$

$w_1^2\sigma_1^2$	$w_1w_2.Cov_{12}$
$w_1w_2.Cov_{12}$	$w_2^2.\sigma_2^2$

- $\mathrm{STD}(\sigma_p) = \sqrt{w_1^2.\sigma_1^2 + w_2^2.\sigma_2^2 + 2w_1w_2.\sigma_1\sigma_2.Corr_{1,2}}$
  - Corr. $\uparrow \rightarrow \sigma \uparrow$
  - Corr. $\downarrow \rightarrow \sigma \downarrow$

Systematic risk and Market portfolio

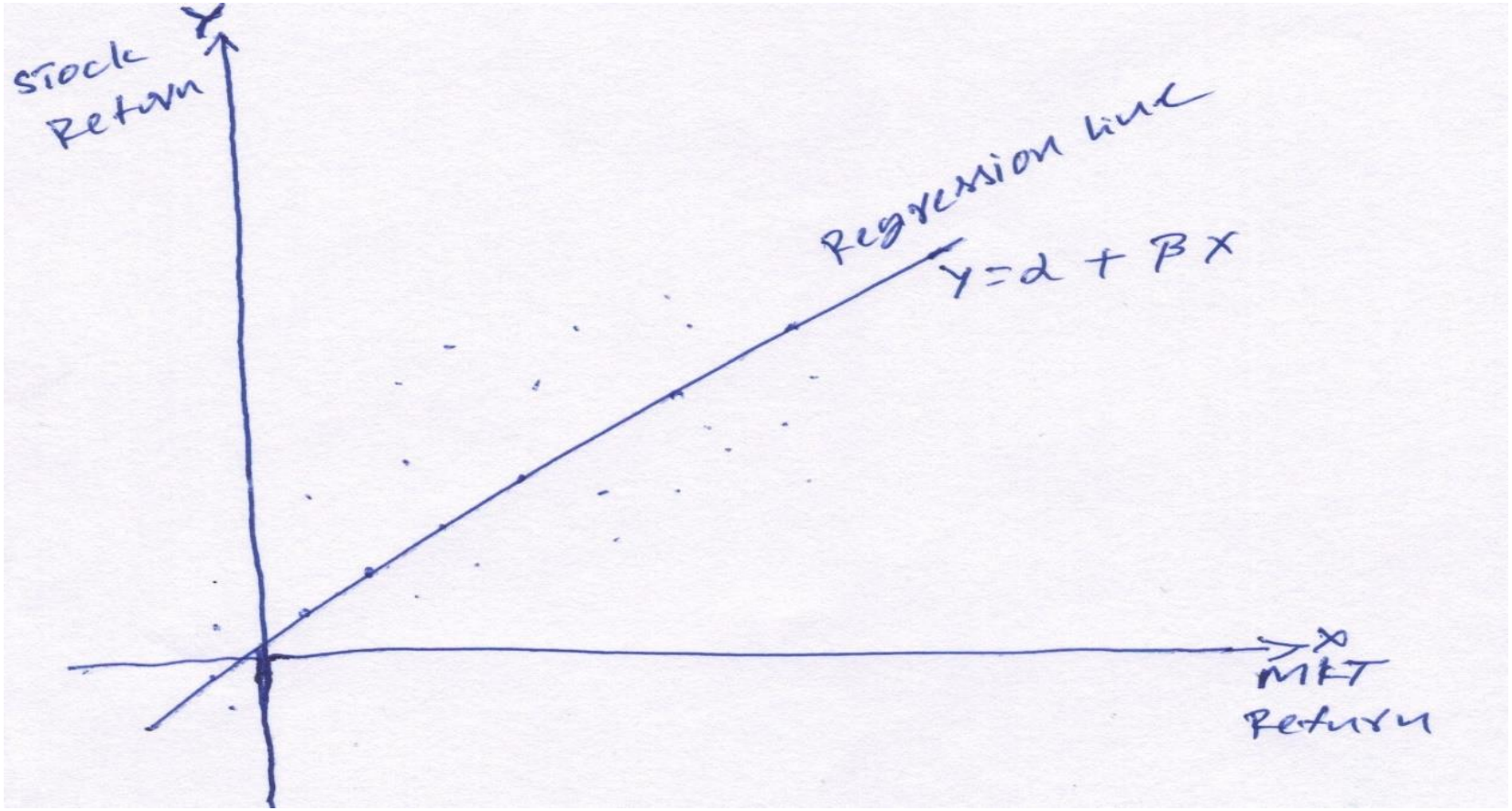
- Market portfolio = all stocks in the market.
- Systematic risk = nondiversifiable risk = Market risk
- Unsystematic risk = diversifiable = idiosyncratic
  - = firm specific
- Total Risk= Systematic + unsystematic
- Sources of Systematic risk:
  - Economy wide
  - Interest rates
  - Taxes
  - Exchange rates
  - Wars
- Investors are only compensated for risks they bear, not diversifiable.



Systematic Risk and Beta

- Earlier we measured the risk of the return by the STD or volatility.
- But STD measures *total risk*, both diversifiable and non-diversifiable.
- It would be preferable to have a measure of the non-diversifiable risk as, in an efficient market, only this risk is rewarded.
- In finance we define such a measure of non-diversifiable risk as “beta”
- For a stock:
  - $\beta_i = \frac{\sigma_i}{\sigma_m} \text{x } \rho_{im}$
- Where,
  - σ_i = STD of return of stock *i*
  - σ_m = STD of market return
  - ρ_{im} = correlation between *i* and *m*
- Conceptually, beta measures:
  - a stock’s volatility relative to the market portfolio as a whole
  - a stock’s contribution of risk to the portfolio
  - Typically it ranges between 0.5 and 1.5.

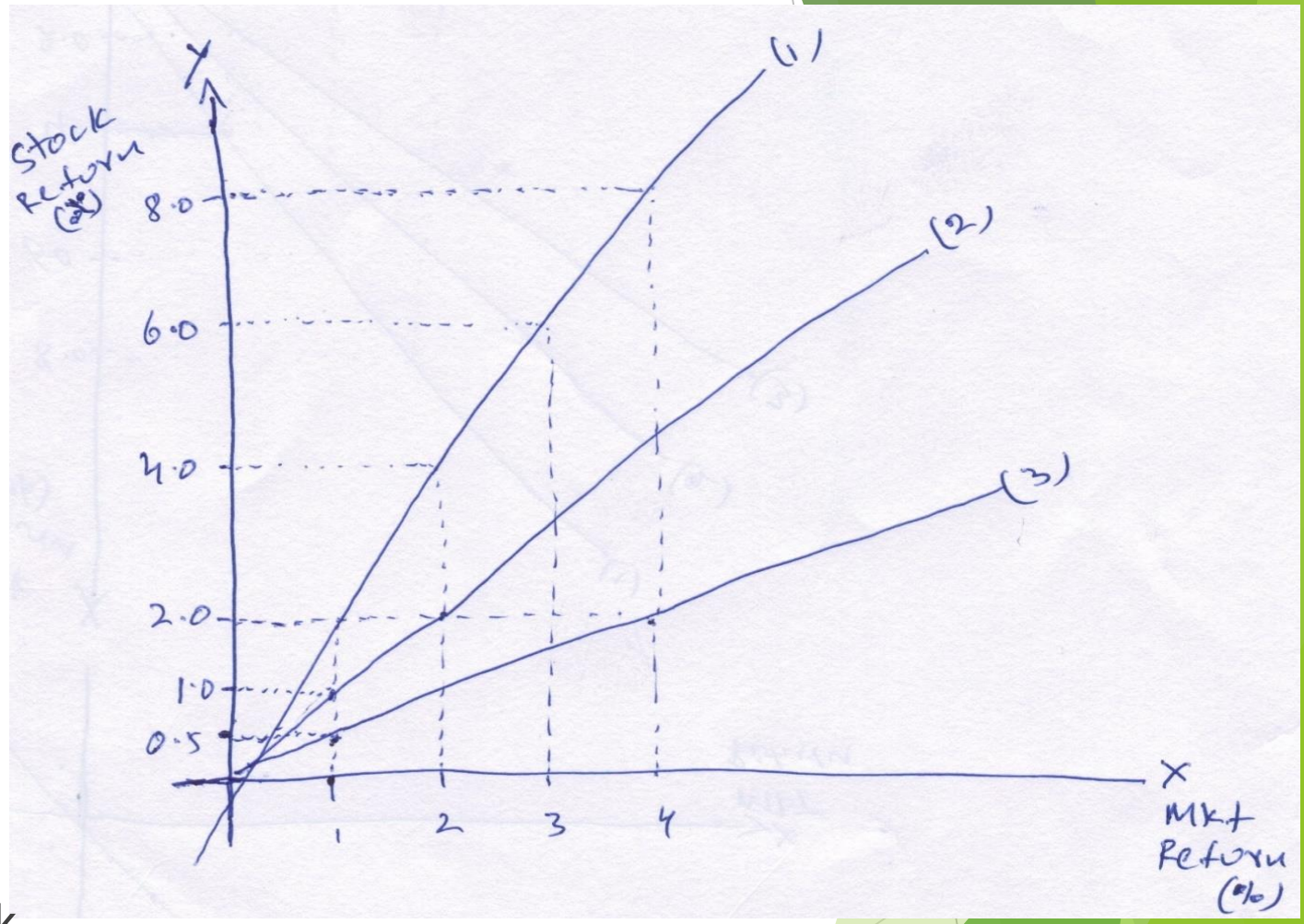
Systematic Risk and Beta



Systematic Risk and Beta

- Beta (β) is a measure of market risk.

1)	+1%	+2%	+3%	+4%	β = 2
	+2%	+4%	+6%	+8%	
2)	+1%	+3%	-7%		Beta = 1
	+1%	+3%	-7%		
3)	+1%	+4%	-3%		Beta = 0.5
	+0.5%	+2%	-1.5%		



- We define beta in such a way that a stock
  - with a beta of 1 has roughly the same volatility as the market as whole;
  - with a beta > 1 has volatility greater than the market
  - with a beta < 1 has volatility less than the market

Portfolio Beta

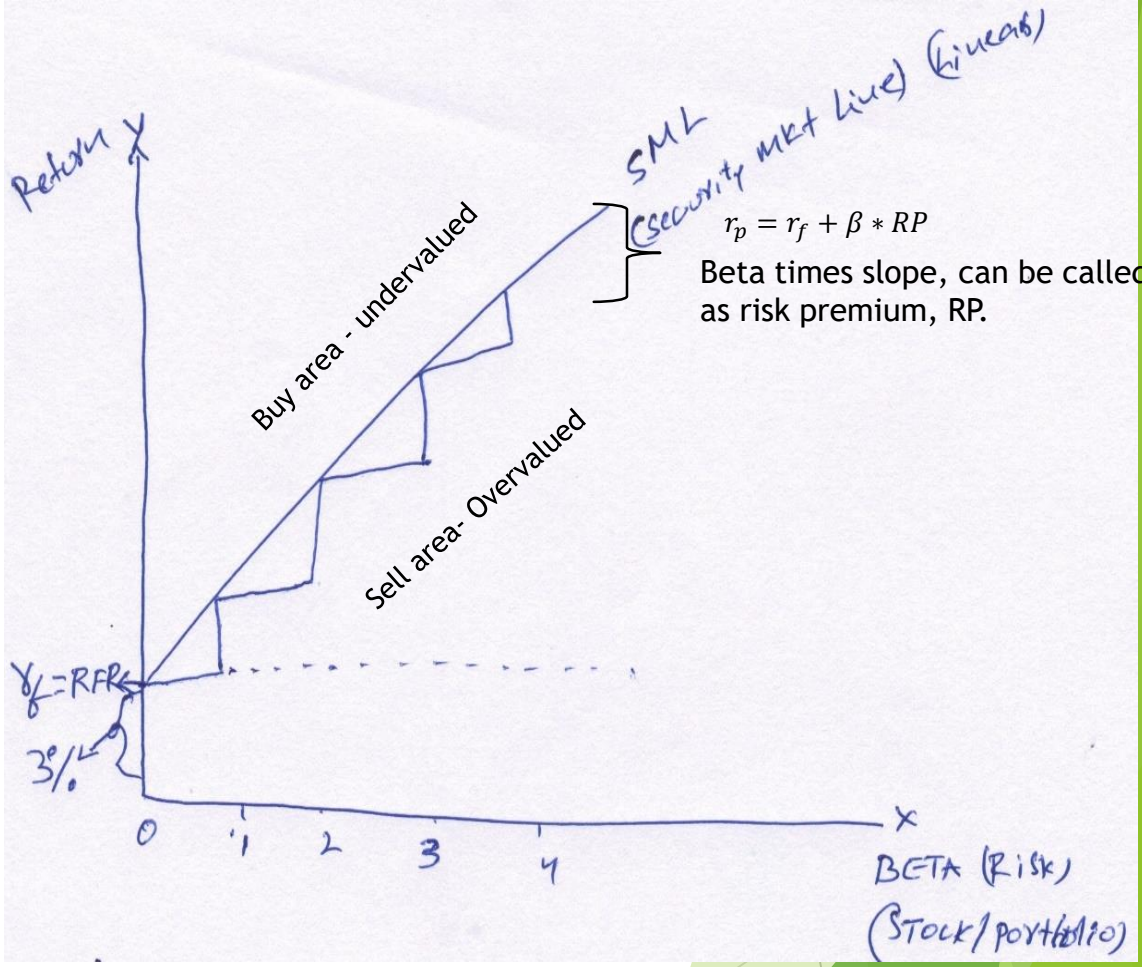
- Portfolio Beta (β_p)= $w_1\beta_1 + w_2\beta_2 + w_3\beta_3 \ldots\ldots + w_n\beta_n$
- where, $(w_1 + w_2 + w_2 + \ldots\ldots + w_n = 1)$
- Example:
  - β_1 = 1
  - β_2 = 3

  β_p= 2 (if weights (w) are equal)
- STD (σ) for a portfolio of N stocks:
  - $\sigma_p = \sqrt{\sum_{i=1}^{N} w_i^2 \sigma^2(k_i) + \sum_{i=1}^{N} \sum_{j \neq 1}^{N} w_i w_j \, Cov(k_i k_j)}$
- where,

  N= Number of assets;
  w = weighs;
  $\sigma^2(k_i)$ = variance of return of i^{th};
  $Cov(k_i k_j)$ = covariance of return of i_{th} asset and j_{th} asset.

Security Market Line (SML) and Capital Asset Pricing Model (CAPM)

- Security Market Line
  - $r_p = return\ on\ portflio = r_f + \beta * RP$ → CAPM
  - where,
    - r_f/*RFR* = Risk Free Rate
    - *RP* = risk premium (market premium)
      - It is the return for taking risk
    - *If* β =1, it is the return for taking market risk
- For Example:
  - r_f =3%
  - *RP* = 8%



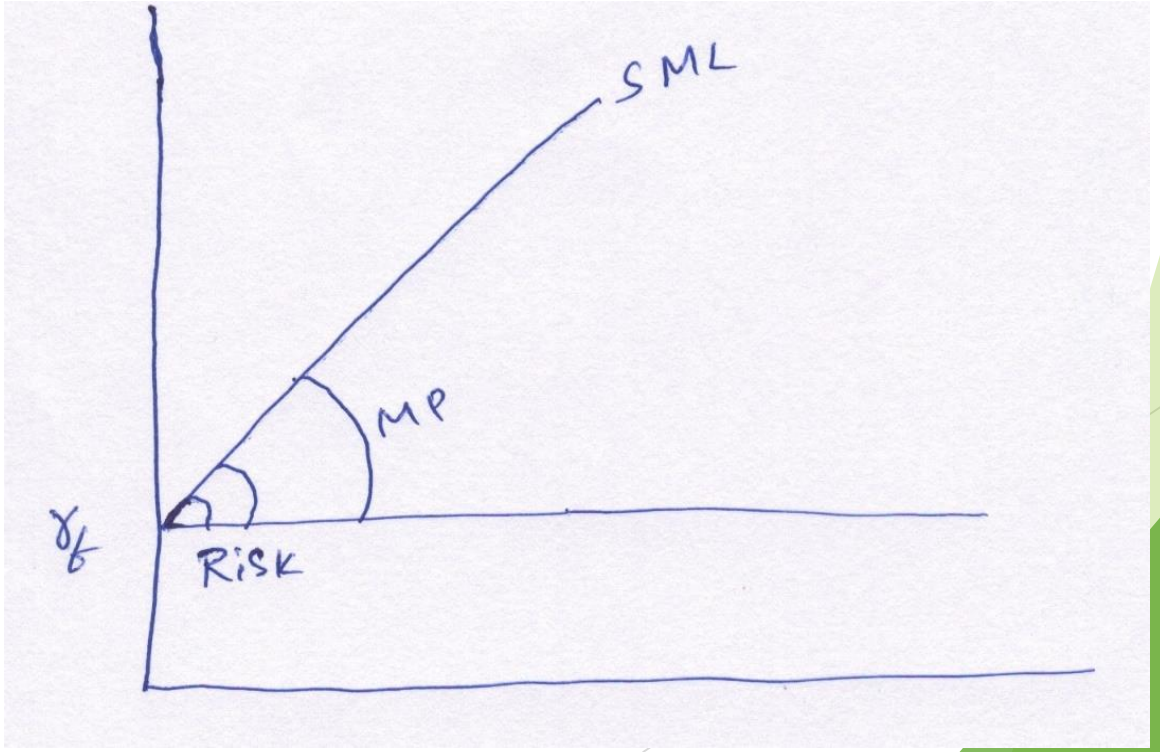
Beta (risk)	Return (expected) (%)
0.5	3 + 4 = 7
1	3 + 8 = 11
1.5	3 + 12 = 15
3	3 + 24 =27

CAPM

- Combine our prior discussions of beta and risk premium and create a general pricing theory.
- The most famous is the Capital Asset Pricing Model or CAPM
- SML is a graphical presentation of CAPM.
- The CAPM states the following:

  Required Return on Stock i = Risk-Free Rate + (Stock i's Beta Coefficient)* (Market Risk Premium)

- Thus,
  - $\hat{r} = r_{fr} + Risk\ Premium$
  - $= r_{fr} + \beta_i(r_m - r_{fr})$
- MP = market premium
  - MP/risk= slope = return/risk
  - Return to risk ratio



CAPM

- The CAPM equation allows us to estimate any stock's required return once we have determined the stock's beta, risk-free rate and market-risk premium.
- Example:
  - We expect the market portfolio to earn 12%, and treasury bond yields are 3.5%. If Tata Motors has a beta of 1.08, the required return for holding this stock is:

$$r_{TM} = r_{RF} + \beta_{TM}(RP_M)$$

$$r_{TM} = 3.5\% + 1.08*(12\% - 3.5\%)$$

$$r_{TM} = 12.68\%$$

  - Therefore, we would require a return of 12.68% for investing in Tata Motors

Caveats

- The “risk / return” relationship rests on the assumption that the stock (or asset) is priced “correctly” and asset markets are efficient. This may not be true.
- Fama, E and French, R.F (1992) found no historical relationship between stocks’ returns and their market Betas. It is related to firm size and market/book ratios. Small firms and firms with low market/book ratios had higher returns.
- As an alternative to the traditional CAPM, models such as APT with more explanatory variables than just beta are proposed. However, they also have some deficiencies when applied in practice.
- CAPM is still widely used by financial professionals.

Measuring Risk – Coefficient of variation

- If a choice has to be made between two investments, X and Y:
  1. They have the same *expected returns* but different standard deviation!!.
  2. They have the same standard deviation but different *expected returns*!!.
- But what if one has the higher expected return but the other has the lower standard deviation?
  - $E(r_X) = 15\ \%;\ S.D = 30$
  - $E(r_Y) = 10\%;\ S.D = 3$
- The coefficient of variation (CV): Gives the risk per unit of return, and provides a more meaningful risk measure when the expected returns on two alternatives are not the same.
  - $CV = \frac{\sigma}{\hat{r}}$
    - where σ *is STD. and* $\hat{r}$ *is expected return*
- *Example:*
  - *For X, CV = 30/15 = 2*
  - *For Y, CV = 3/10 = 0.3*
  - X is about 6.6 times riskier than Y.

Risk Averse and Required Rate of Return

- Suppose, you have got two options to invest your ₹1m.
  1. In T-bills @ 5 % (sure)
     1. ₹ 1m (1+ 0.05) = ₹1.05m ⇒ ₹50,000 return
  2. In stocks of R&D
     1. If R&D programme success⟶ the value of investment ⇒₹ 2.1m.
     2. If it fails the value of investment will be 0 (zero).
- What will you choose???
  - Regard the success /failure 50:50.
    - 50(0) + 50 (2.1m) = ₹10,50,000 or
    - Return = 5% i.e., ₹50,000, which is same as the return on T-bills.
- So, obliviously T-bills(sure) is preferred.
  - Because, people are risk averse.
- What is the implication of risk aversion for security prices and return???

Risk Averse and Required Rate of Return(Cont.)- Implication of risk aversion

- Other things remain constant, higher the risk of a security, higher its expected return. If this does not hold prices move/change to bring about the required situation.
- Example:

Stock X price = ₹100	Stock Y price = ₹100
E(r) = 10%	*E(r)* = 10%
S.D = 50	S.D = 4

- Risk averse investors prefer Stock Y.
- Buying pressure on Y and selling pressure on X. These price changes, in turn, would change the expected returns of the two securities.
  - For instance, Y's price will go up from ₹100 to ₹125 and X's price will decline from ₹100 to ₹ 77. These changes would cause Y's expected return to fall to 8% and X's return to rise to 13%.
    - Assume each stock is expected to pay shareholders ₹10 a year in perpetuity and take the price of the perpetuity (i.e. annual cash flows divided by stock return).
    - Thus, if the stock's expected return is 10%, the price = ₹ 10/0.10 = 100.
      - Y: → 10/0.08 = 125
      - X: → 10/0.13 = 77
- The difference, i.e. 13-8 = 5%, is risk premium.

Securities Markets and Their Efficiency

- Central Trading Places
  - Stock Exchanges
  - Types of orders and Their Execution
- Financial Markets without Central Trading Places
  - Bond and Foreign exchange markets

Market Efficiency

- *Operational Efficiency*: Trades are executed at the lowest possible cost.
- *Informational efficiency*: All the relevant information is fully reflected in price.
- Example of transaction costs:
  - 100 shares of XYZ are bought at ₹900 per share
  - Broker's commission = ₹7500
  - As a result,
    - buyer pays ₹97500 (i.e. 90000 + 7500)
    - Seller gets ₹82500 (i.e. 90000-7500)
    - And also add bid-ask spread of say 2%.
- Operational Efficiency is a prerequisite for informational efficiency.
- Intrinsic value = fair value ⇒ A selling price if all the investors know about the stock's expected cash flows and risk.
- Efficient market ⇒ A market in which prices are close to intrinsic values and the stock seems to be in equilibrium.
  - Market price > Fair value = over valued
  - Market price < Fair value = undervalued
  - Market price = Fair value = Efficient market

Efficient Markets

- Stock prices are determined by:
  - Profit expectations
  - News and information
  - Strength of Economy(macro), industry(sector) and company(firm).
- According to the efficient market hypothesis (EMH), the stock market is informationally efficient.
  - Prices instantly reflect the consequences of past events and all expectations about future events.
  - Only new information will change the value of the security. Future information is unpredictable, so changes in the price of a security are random.

Abnormal Returns

- Abnormal return (also called as excess return), refers to the unanticipated profits (or losses) generated by a security/stock. It is the difference between the actual returns and the expected returns.

- For instance,
  - β (beta) = 1; $E(R_s)$= R(M)= 17%
  - R_s = 19%??
  - 19%-17% = 2%

Efficient Market Hypothesis (EMH)

- For what types of information does this market efficiency hold?
- Three main variants of the EMH have been distinguished by Fama (1965):
  - The weak form- considers only past prices
  - The semistrong form- also considers publicly available information
  - The strong form -looks also at nonpublic ("inside") information

The Weak form

- *'all relevant information contained in the past history of stock prices will be reflected in the current price'*.
- As to the weak-form, the price of an asset is the sum of three components:

$$P_t = P_{t-1} + \text{Expected return} + \text{random error}$$

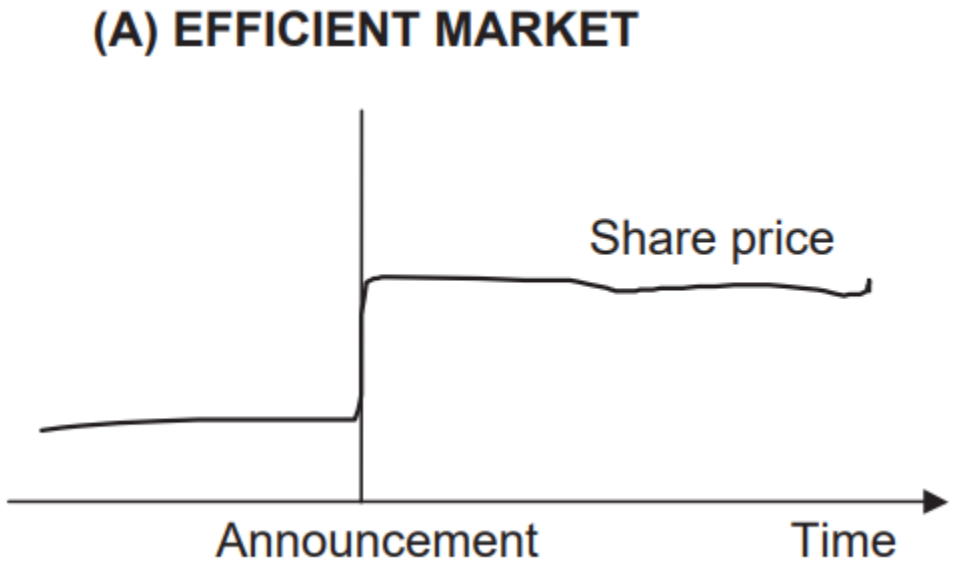
  - P is price; and the component of random error is independent from past events and unpredictable in the future.
  - When prices follow this model, they follow a random walk.
- Widely used technique: Correlation from T-1 → T is zero.
- Therefore, technical analysis (which assumes patterns) has no practical value.
- And, the notion that *"if a stock rises three consecutive times, buy it; if it declines two consecutive times, sell it"* is irrelevant.
- Empirical evidence- TRUE
- There is seasonality...January effect(↑↓↓), December effect(↑↑↓),weekend effect-monday effect!

The Semi Strong form (cont.)

- *'Public information can't help investor to make profitable trade'.*
  - All publicly available information, as found in annual reports, newspaper and magazine articles, prospectuses, announcements of new contracts, of a merger, of an increase in the dividend, etc.
- It is superior to weak-form efficiency because it requires that current prices include historical information (as assumed by the weak-form efficiency) and publicly available information.
- Since historical information is a subset of all public information, if semistrong form holds, weak form must hold as well. However, it is possible for weak form to hold when semistrong form does not.
- Use of fundamental analysis??
- Empirical evidence- MIXED
- How Rapidly Do Prices Adjust to News- Market is much more volatile when it is open than when it is closed.

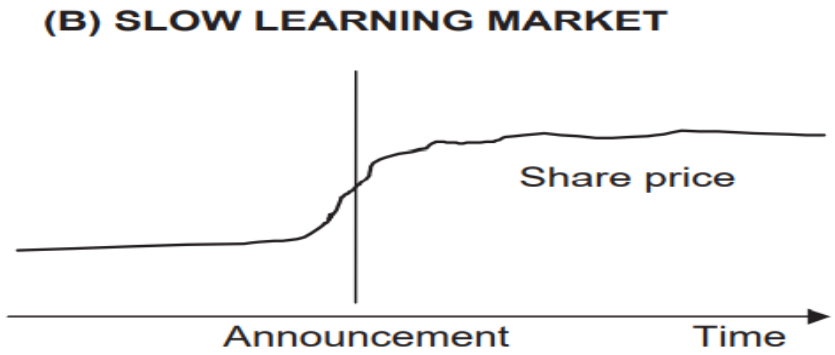
Semi Strong form (cont.)

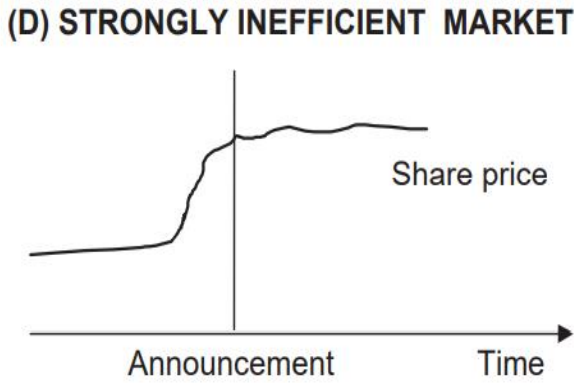
- This hypothesis can be tested in two ways: with event studies that examine the market's reaction to price-sensitive announcements from companies, or with the analysis of mutual funds performance.
- Event studies:
  - AB = Return from a stock – Return of the market
- According to the semi-strong efficiency hypothesis, the abnormal return should be confined to the announcement day and ideally no abnormal return should be registered before or after the announcement.

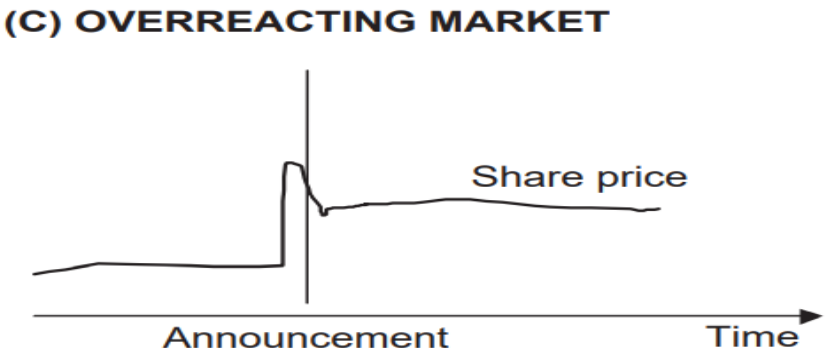


Semi Strong form (cont.)

- The higher the deviation from the fair market value and the more slowly it fades away, the less efficient is the financial market.
- In this case, we are faced with two alternative situations:







- These depict inefficient markets because of the way the price converges at a new equilibrium price implicit in the announcement: with a delay (case B) or by erroneously estimating the value of the new information (Case C).
- If there is a clear trend in prices before the announcement, a few privileged investors had access to the information before the formal announcement was made to the entire market (D)

Semi Strong form (cont.)

- Mutual funds performance:
  - The second methodology for testing semi-strong efficiency is to analyse the performance of mutual funds.
  - In an efficient market, we would expect that their average returns would not differ systematically from the returns obtained by an average investor with a well diversified portfolio.
  - The empirical evidence show that the managers of mutual funds tend to achieve negative performances compared to the market.
  - Then, why do mutual funds exist?
  - Some may think that investors are rational if they compose their portfolio by randomly choosing stocks from a list of public companies. The major problem with this strategy is that investors may face undesired risks if the titles they choose are not consistent with their risk/return profile. The wide variety of mutual funds may help to solve this problem.

Efficient markets- Reality?

- Actual markets approach the theory of an efficient market when:
  - participants have low-cost access to all information;
  - transactions costs are low;
  - the market is liquid;
  - investors are rational.
- Example:
  - A stock is expected to rise 10% tomorrow. In an efficient market, its price will rise today to a level consistent with the expected gain. Tomorrow's price will be discounted to today. Today's price becomes an estimate of the value of tomorrow's price.

The Strong form

- *'stock prices fully reflect all information about the firm, both public and private'.*
- *Thus, even learning private information about the firm is of no help in earning more than the required rate of return, which means, no information, public or private, can help you to make profitable trade.*
- This holds true only when financial market regulators have the power to prohibit and punish the use of insider information.
- In an efficient market, the experts' performance is slightly below the market average, in a proportion directly related to the management fees they charge!
- If strong form holds, semi strong form must hold as well. However, semi strong form can hold when strong form does not. This implies that private information can be used to produce abnormal returns, but as soon as the private or inside information is publicly released, abnormal returns are unobtainable.
- Empirical evidence: Strong form is FALSE

Origin of behavioural Finance

- Irrational and Emotional- Investors
- Thaler and Barberis criticism of EMH- Two points
  - It is difficult for a trader to take advantage of mispriced asset.
  - Why mispricing occurs – Individual view potential losses and gains differently.

Security Analysis

- Security Analysis and Market Efficiency
  - Those who have the new information early (notably those who generated it) will make money.
  - If the investor is to be rewarded for time and money spent on security analysis, he or she must obtain information that is both relevant and new.
  - Profitable only if the value realize from the new information exceeds what it costs to produce it.

Security Analysis- a modern view

- The price will be the present value of the future cash flow that it is expected to generate, discounted at a rate that corresponds to the security's beta.
- Objectives:
  - To identify current profit and cash flow,
  - To forecast how profit and cash flow will grow or decline in the future, and
  - To assess the risk of fluctuations around this forecast including the risk that the cash flow will be interrupted.
- Macroeconomic Developments and Changes in Regime
- Industry Growth – Elasticities
- Industry structure- Structure-Conduct –Performance(SCP); Five forces useful:
  - Threat of entry
  - Pressure from substitute products
  - Bargaining power of buyers
  - Bargaining power of Suppliers
  - Pattern of rivalry between existing competitors
- Firm Specific Factors – cost advantages, differentiation and focus.

Security Analysis- The role of financial statement analysis

- Has two main functions:
  - To measure the past and present performance of a firm' s strategy
  - To provide a framework for quantifying judgements about the future performance of a firm's strategy and the risks associated with it.
- Shorts cuts in security valuation!
  - Uses and Pitfalls of price/earning ratios
  - Tobin’s q

Stock Indexes

- Dow Jones Industrial Average (DJIA-1896)- Smokestack
  - *Price-weighted averages: the stock prices of the companies in the indexes are added together and divided by an adjusted value, (or divisor):*
    - $\sum_{i=1}^{30} \frac{P_{it}}{Divisor}$; P_{it} = Price of each stock in the Dow index on day t
    - *The divisor was set at 30 in 1928, this value dropped to 0.1321 by August 2010.*
- S&P 500 Index (1926) – Hightech
  - *A value-weighted index: the current market values (stock price x number of shares outstanding) of all stocks in the index are added together and divided by their value on a base date.*
    - Top 500 of the largest U.S. corporations listed on the NYSE and the NASDAQ.
    - Over 80% of the total market value of all stocks listed on the NYSE.
- The NYSE Composite Index (1966)
  - Value-weighted index.
  - All stocks listed NYSE- the composite index.
  - In addition, NYSE stocks are divided into four subgroups: industrial, transportation, utility, and financial companies.
  - A base value of 5,000 was fixed in 2003. The original base value was 50 set in 1965.
- NASDAQ Composite Index (1971)
  - A value-weighted index - three categories - industrials, banks, and insurance companies.

Securities Markets and Their Efficiency

- Central Trading Places
  - Stock Exchanges
  - Types of orders
- Financial Markets without Central Trading Places
  - Bond and Foreign exchange markets

Price-Weighted versus Value-Weighted Indexes

- An index has four firms:
  - A – Price ₹50; shares outstanding 100 million
  - B - Price ₹25; shares outstanding 400 million
  - C- Price ₹60; shares outstanding 200 million
  - D - Price ₹5; shares outstanding 50 million
- For price-weighted (PWI), its initial value:
  - $PWI = \sum_{i=1}^{4} \frac{P_{it}}{4}$ = (₹50 + ₹25 + ₹60 + ₹5)/4 = 140/4 =35.
- For value-weighted (VWI), its initial value:
  - $VWI = \sum_{i=1}^{4} [\frac{P_{it} \text{ x } Numbe\ of\ shares\ outstanding}{4}]$
  - [(₹50 x 100m) + (₹25 x400m) + (₹60 x 200m) + (₹5 x 50m)]/4 = ₹6812.5m.
- Suppose, the share prices change to ₹55, ₹24, ₹62, and ₹6, respectively!!
  - The PWI value changes to:
    - $PWI = \sum_{i=1}^{4} \frac{P_{it}}{4}$ = (₹55 + ₹24 + ₹62 + ₹6)/4 = 147/4 = 36.75. i.e. *%Δ in the index is 5 %.*
  - The VWI value changes to:
    - [(₹55 x 100m) + (₹24 x400m) + (₹62 x 200m) + (₹6 x 50m)]/4 = ₹6950m. i.e. *%Δ in the index is 2.02%.*

Price-Weighted versus Value-Weighted Indexes(cont.)

- Alternatively, there is stock split ….indexes are unaffected!!!
  - Firm A undergoes a 2-for-1 split - Its price falls to ₹27.50 and the number of shares increases to 200m
  - The new price = ₹119.50 = ₹27.5 + ₹24 + ₹62 + ₹6
  - The divisor on the price-weighted index gets adjusted:
    - Divisor = 119.50 / 36.75 = 3.2517
    - $PWI = \sum_{i=1}^{4} \frac{P_{it}}{3.2517}$ = (₹27.5 + ₹24 + ₹62 + ₹6)/3.2517 = 119.50/3.2517 = 36.75
    - Thus, the value of the price-weighted index remains at 36.75 !!.
  - The value weighted index also remains at ₹ 6950.
    - [(₹27.5 x 200m) + (₹24 x400m) + (₹62 x 200m) + (₹6 x 50m)]/4 = 27800/4= ₹ 6950.

BSE-Sensex-1986

- 30 stocks of large, well established and financially sound companies.
- Initially based on the "Full Market Capitalization“, but shifted to the *free-float methodology* in 2003.
- Example: Two companies – A & B.
  - A @ ₹200 (100,000 outstanding shares) & B @ ₹ 150 (200,000 outstanding shares)
  - Market capitalisation = ₹ 200 x 100,000 + ₹150 x 200,000 = ₹500lakhs ⇒ ⇒ Assuming → 100 points.
  - Suppose, there is a price change → A's to ₹260 (30%↑) & B's to ₹135 (10%↓).
  - New Mkt Cap. = (₹ 260 x 100,000) +(₹135 x 200,000) = ₹530lakhs → 6% ↑ mkt cap ⇒ ⇒ index ↑ (6%↑) from 100 to 106.
- *Free-float* - the proportion of total shares available for trading to the general public.
- *Free float mkt value = market value x free float market value factor.*
  - Market value of a company = ₹ 100,000 crore (=100 crore shares x ₹1000 each). 20% is available to public for trading.
  - Free float factor = 20/100 = 0.20
  - *Free float market value = ₹100,000 crore x 0.20 = ₹20,000 crore.*
- *SENSEX= (free float market capitalization of 30 companies/base market capitalization) *100).*
  - Rs. 2501.24 crore is to be used as the base market capitalization. The base index value is 100(1978-79).