Lecture

IAQS | INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Class: SY BSc

Subject : Portfolio Theory and Security Analysis

Subject Code:

Chapter: Unit 1 Chapter 1

Chapter Name: Efficient Market Hypothesis

Today's Agenda

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2. Random Walk Theory
3. Efficient Markets
    1. Factors affecting EMH
4. Types of information
5. Versions of EMH
6. Types of Stock Analysis
7. Implications of Efficient Market Hypothesis
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16. Role of portfolio management in efficient markets

1 Introduction

As is so often the case with important ideas, the concept of efficient capital markets stemmed from a chance discovery.

In 1953, Maurice Kendall, a British statistician, presented a paper to the Royal Statistical Society on the behavior of stock and commodity prices.

He expected to find regular price cycles (of boom & bust), corresponding to economic cycles but found no predictable pattern in stock prices.

Prices are as likely to go up as to go down on any particular day

1.1 Efficient Market Hypothesis

- Prices seemed to evolve randomly. They were as likely to go up as they were to go down on any particular day, regardless of past performance.

- This phenomenon was coined as ‘random walk’, It soon became apparent that random price movements indicated a well-functioning or efficient market, not an irrational one.

- How do we explain random stock price changes?

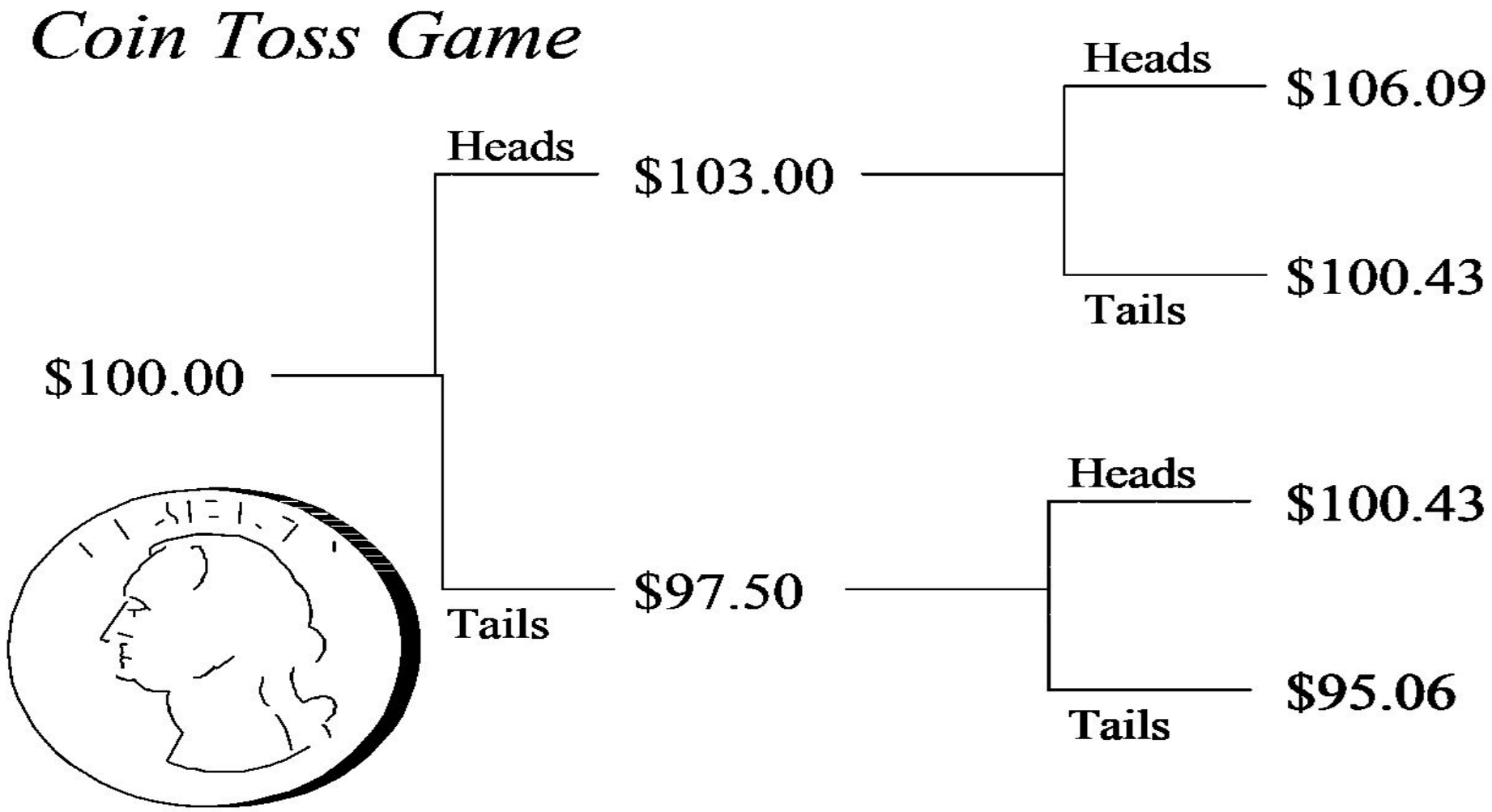
1.1 Efficient Market Hypothesis

- EMH says stock prices already reflect all available information
- A forecast about favorable future performance leads to favorable current performance, as market participants rush to trade on new information.
- Result: Prices change until expected returns are exactly commensurate with risk.
- New information is unpredictable; if it could be predicted, then the prediction would be part of today's information.
- Stock prices that change in response to new (unpredictable) information also must move unpredictably.
- Stock price changes follow a random walk.

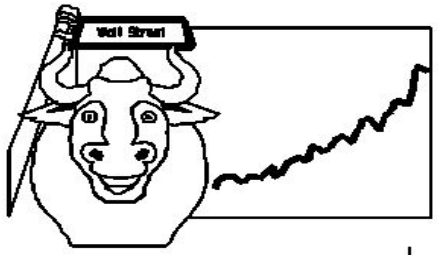
2 Random Walk Theory

- The movement of stock prices from day to day does not reflect any pattern
- Statistically speaking, the movement of stock prices is random. *(skewed positive over the long term)*

2 Random Walk Theory



2 Random Walk Theory



3 Efficient Markets

What is meant by an efficient market?

3 Efficient Markets

- An efficient market is one in which security prices quickly and accurately reflect all available and relevant information.
- Stock prices already reflect all available information.
- Efficient market is one in which information is rapidly disseminated and reflected in prices.

3 Efficient Markets

- The importance of market efficiency derives from the fact that if markets are inefficient then investors with better information may be able to obtain higher investment returns.
- If, however, markets are efficient than it is not possible to identify under or over-priced securities which can then be traded to generate access risk-adjusted returns.
- Hence it is not worth trying to do so.
- Recently, GameStop (an American video game, consumer electronics, and gaming merchandise retailer) tested efficiency of markets as the shares skyrocketed due to short squeeze orchestrated by users of the Internet forum/wall street bets.

Read the complete article- GameStop Tests Efficient Capital Market Hypothesis

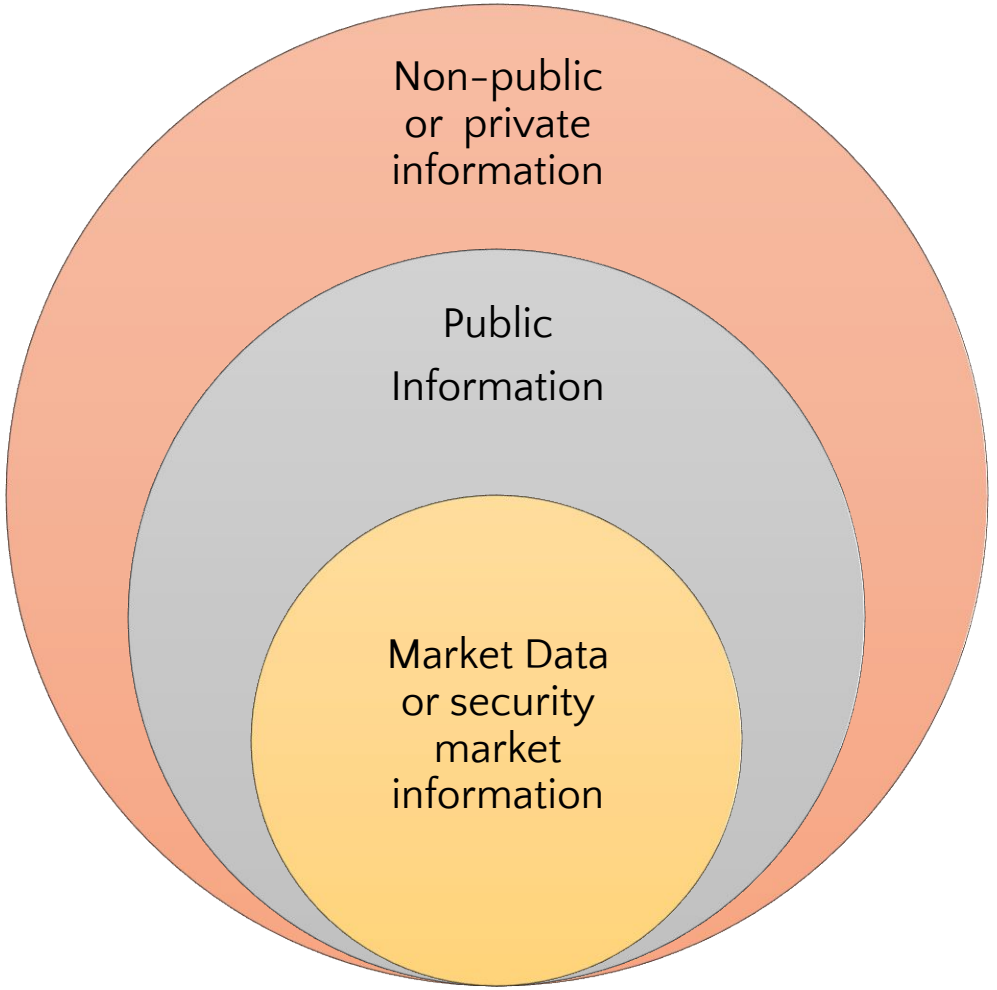
3.1 Factors Affecting Market Efficiency

Guess which factors can affect market efficiency?

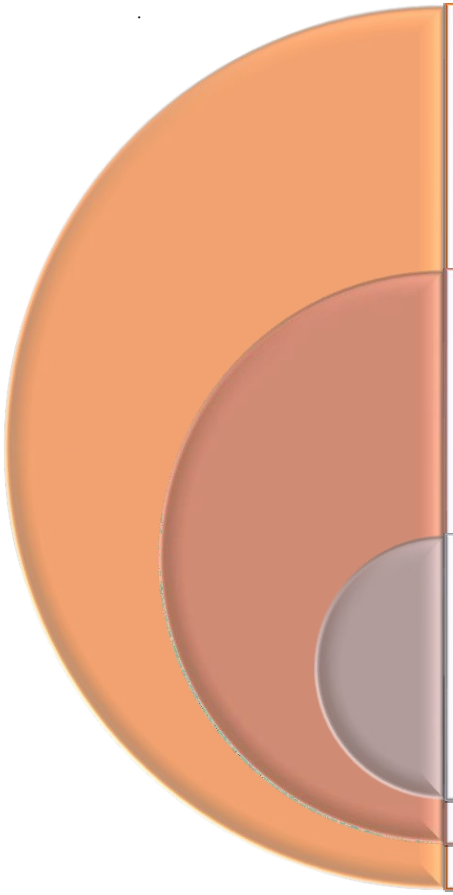
3.1 Factors Affecting Market Efficiency

- Number of market participants
- Availability of Information
- Limits to trading
- Transaction Costs
- Information Costs

4 Types of Information



5 Versions of EMH



Strong	• Prices reflect all the information relevant to the firm, including the insider information
Semi-strong	• All publicly available information on fundamentals is already in the price • No point in doing fundamental analysis
Weak Form	• All information on trading data is already in the price • No point in doing trend or technical analysis

Question

Discuss the following:

State the form of EMH

1. Annual market returns in consecutive years have a negative correlation of -0.85
2. The closing value of the index of hundred stocks with the highest market capitalization has been found to be 1.5% on average on Fridays then on Monday.
3. Announcements of changes in Companies dividend policies typically take 2 months to become fully reflected in the quoted share price.
4. The prices of Adani enterprise have been consistently observed to fall immediately following a favourable announcement and to rise immediately following and unfavourable announcement.

Question

CT8, September 2013, Q3

1. Outline the three forms of Efficient market hypothesis.

2. Discuss the following two scenarios in the light of the EMH.

a) Scenario 1 company is share price falls suddenly immediately after news of an earthquake in the capital city of one of its major markets

b) Scenario 2 company 20 share price fall suddenly when a long awaited and publicly negotiated merger is completed.

Solution

Answer 1.

- Strong form EMH: market prices incorporate all information, both publicly available and also that available only to insiders.

- Semi-strong form EMH: market prices incorporate all publicly available information.

- Weak form EMH: the market price of an investment incorporates all information contained in the price history of that investment.

Solution

Answer 2.

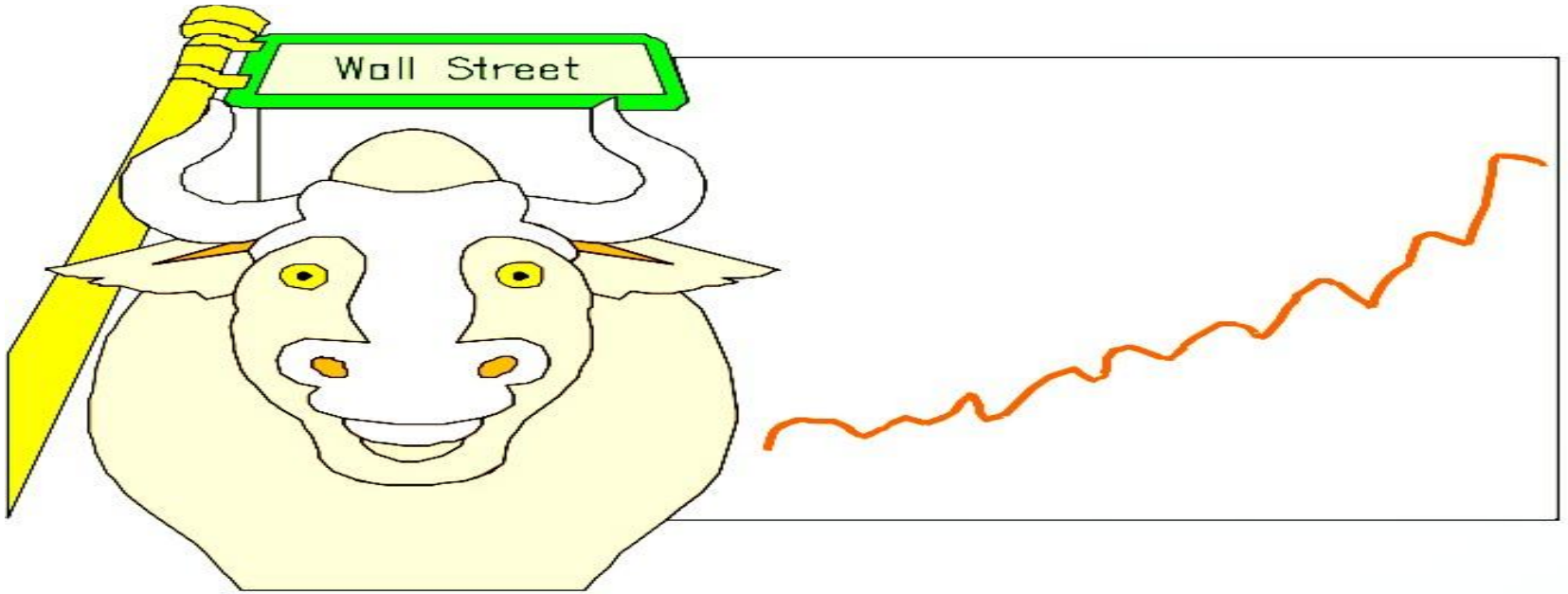
Scenario 1: The first event tells us nothing about the EMH–assuming this earthquake was not predictable, its happening could not have been discounted in market prices. A quick adjustment of prices in response to a news announcement suggests evidence for the semi-strong form (and by implication the weak form) EMH.
However, although the price drop was quick, we have no idea how accurate it was. It is possible that the market has over or under reacted to the bad news and will correct itself later. If this is the case, then it suggests markets are not efficient.
Some earthquake specialists (insiders) may have known about the earthquake shortly in advance but there is no mention of price movements before the earthquake, perhaps this suggests the market is also strong form efficient.

Scenario 2: The second event strongly contradicts the strong-form EMH. Insiders are privy to all information about the merger talks and therefore there shouldn't be a sudden reaction.
Indeed, given the public nature of the negotiations, this seems even to contradict the semi-strong form (and by implication the strong form) of the EMH although perhaps markets were pricing in a significant probability of the merger failing or overreacting to the benefits and then correcting themselves.

6 Types of Stock Analysis

1. Technical Analysts

Forecast stock prices based on watching the fluctuations in historical prices (aka "**chartists**")

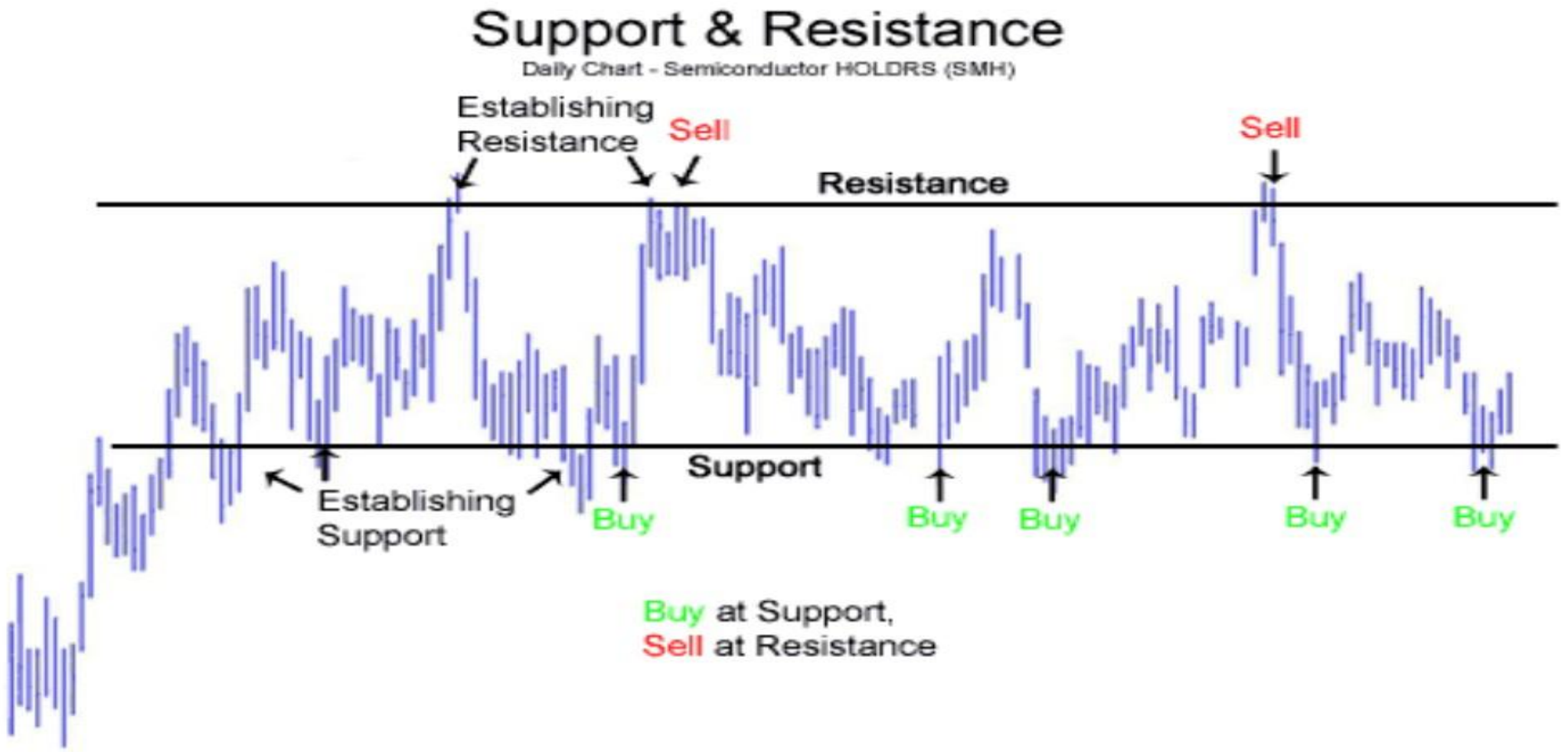


6 Types of Stock Analysis

Technical Analysis – using prices and volume information to predict future prices

- Success depends on a sluggish response of stock prices to fundamental supply- and-demand factors.
- Technical Analysis is a form of security analysis
  - Uses price & volume data which is often graphically displayed
  - Does not require detailed knowledge of underlying instrument
  - Objective is to make a buy/sell/hold decision
- Technical Data means price & volume trends

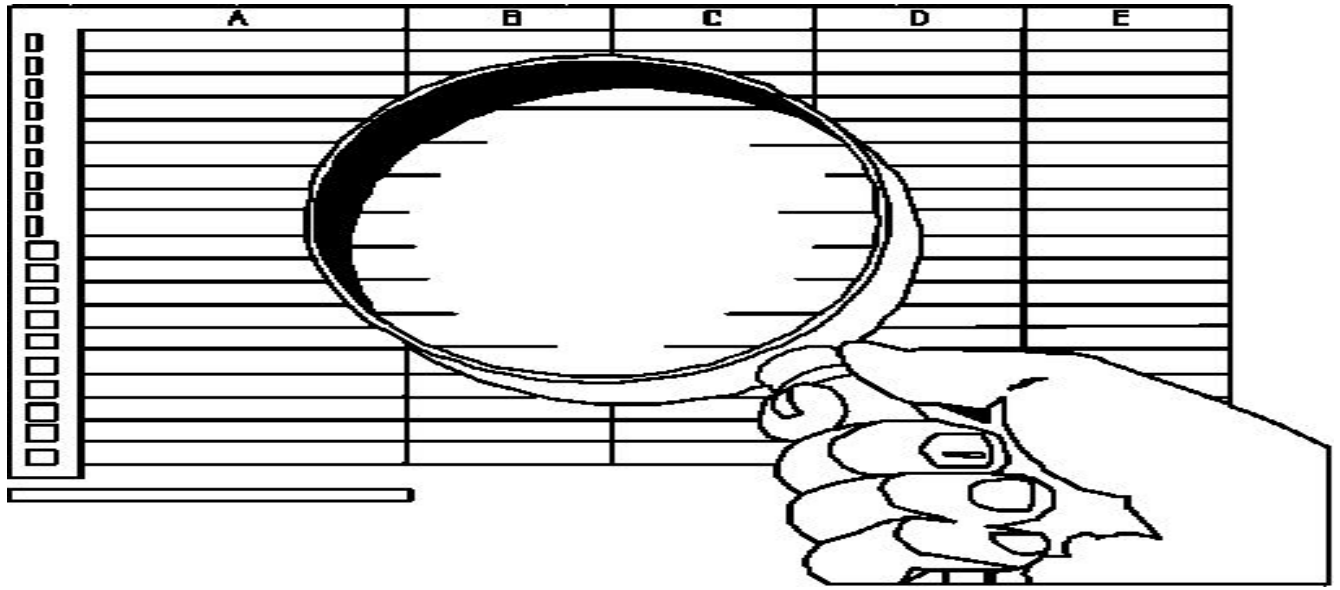
6 Types of Stock Analysis



6 Types of Stock Analysis

2. Fundamental Analysts

Research the value of stocks using NPV and other measurements of cash flow.



6 Types of Stock Analysis

Fundamental Analysis – using economic and accounting information to predict stock prices. Traditional investment analysis involved detailed scrutiny of company accounts, to calculate fundamental values, and thus ascertain when a given investment is cheap or expensive

- Try to find firms that are *better than* everyone else's estimate
- Try to find poorly run firms that are *not as bad* as the market thinks
- Semi strong form efficiency and fundamental analysis: *most* of fundamental analysis is doomed to fail

7 Implications of EMH

- The EMH suggests that it is impossible for investors to systematically generate excess *risk-adjusted* investment returns.
- However, it may be possible to systematically generate higher absolute investment returns by taking additional risk.

8 Arguments of EMH

EMH argues that markets are efficient, leaving no room to make excess profits by investing since everything is already fairly and accurately priced.
This implies that there is little hope of beating the market, although you can match market returns through passive index investing.

But some people make excess returns from trading and investing…

Do you know any famous trader that made excess returns? Discuss…..

8 Arguments of EMH

For example- Warren Buffet

EMH proponents, however, argue that those who outperform the market do so not out of skill but out of luck, due to the laws of probability: at any given time in a market with a large number of actors, some will outperform the mean while others will underperform.

9 Active or Passive Management

Active management

- An expensive strategy
- Suitable only for large portfolios

Passive Management: No attempt to outsmart the market (b/c you can't)

- Accept EMH
- Index Funds and ETFs

10 Difficulty of Testing the EMH

Weak form	Semi-strong form	Strong form
• It is impossible to test all different forms of technical analysis, in order to see if it can add value	• It's not always clear whether information is public or private	• Insider information is generally not available

11 Are Market Efficient?

Magnitude Issue	• Only managers of large portfolios can earn enough trading profits to make the exploitation of minor mispricing worth it.
Selection Bias Issue	• Only unsuccessful or partially successful investment schemes are made public. The really good ones will remain private.
Lucky Event Issue	• There are several cases of investors who have made huge investment returns over a period. However, this does not disprove EMH, because the number of investors is so large, just by chance, some have to make huge returns.

12 Market Pricing Anomalies?

- Anomaly: An anomaly is something that deviates from the common rule.
- Market pricing anomalies: potential inefficiencies that cause securities to be mispriced.
- Tests of the EMH are frequently called *anomaly studies*, so in the efficient markets literature, a **market anomaly** is something that would lead us to reject the hypothesis of market efficiency.

12.1 The Test (or the anomalies)?

Weak Form Tests

- Returns over short horizons
- Returns over long horizons

Semi-Strong Tests

- P/E Effect (adjustment for risk?)
- Small Firm Effect
- Neglected Firm Effect
- Liquidity Effects
- Book-to-Market Ratios
- Post-Earnings
- Announcement Price Drift

Strong Tests

- Inside Information

12.1.1 Weak Form Tests

- Essentially, these are tests of efficacy of technical analysis
- One way of discerning trends in stocks is by measuring serial correlation of stock market returns
- Negative correlation could be explained by *fads hypothesis*

Returns over the Short Horizon

Momentum: Good or bad recent performance continues over short to intermediate time horizons (esp. portfolios)

Returns over Long Horizons

Episodes of overshooting followed by correction, negative correlation

12.1.2 Semi-strong Tests

P/E Effect (adjustment for risk?)	Stocks with low P/E ratios perform better
Small Firm Effect	Portfolios of small firms tend to perform better than large firms
Neglected Firm Effect, Liquidity Effects	Some firms are neglected by large investors, and so less information is available. A premium is required to compensate for this risk of less information. This may also explain small firm effect
Book-to-Market Ratios	High book to market firms have historically outperformed the market
Post-Earnings Announcement Price Drift	CAR of stocks has been shown to increase even after the information about the event becomes public

12.1.3 Strong Tests

- Markets are not expected to be strong-form efficient: people with inside information should be able to make superior profits
- Insider Trading is illegal in all the countries
- SEC requires all insiders to register their trading activity

Check out these real life insider trading incidents on Investopedia.

13 Informational Efficiency

- The EMH states the asset prices reflect information however it does not explicitly tell us how many information affects prices. For example – the speed and extent to which it does so.
- It is also empirically difficult to establish precisely when information arise for example many events are widely rumoured prior to official announcement.
- Many studies show that the market over-reacts to certain events and under-reacts to other events. However the over/under-reaction is corrected over a long period of time and traders can take advantage of the slow correction of the market.

14 Market Anomalies

- **January effect**- The January Effect is a perceived seasonal increase in stock prices during the month of January. Analysts generally attribute this rally to an increase in buying, which follows the drop in price that typically happens in December when investors, engaging in tax-loss harvesting to offset realized capital gains, prompt a sell-off.

- **Days of the week**- Research has shown that stocks tend to move more on Fridays than Mondays and that there is a bias toward positive market performance on Fridays. It is not a huge discrepancy, but it is a persistent one. The Monday effect is a theory which states that returns on the stock market on Mondays will follow the prevailing trend from the previous Friday. Therefore, if the market was up on Friday, it should continue through the weekend and, come Monday, resume its rise. The Monday effect is also known as the "weekend effect."

For more interesting anomalies check out on Investopedia.

15 What Explains these anomalies?

- The majority of the evidence suggests that reported anomalies are not violations of market efficiency but are due to the methodologies used in the tests of market efficiency.
- Researchers argue that the evidence of overreaction to new information is due to the nature of the statistical tests used and that evidence of momentum effects in securities prices reflects rational investor behavior.
- Investors appear to *exhibit bias* in their decision making, base decisions on the actions of others, and not evaluate risk in the way traditional models assume they do.
- The anomalies arise just due to data mining. Investigating data until a statistically significant relation is found is referred to as data mining or data snooping.
- Both underreaction and overreaction have been found in the markets, meaning that prices are efficient on average

16 Role of Portfolio Management in Efficient Market

If markets are indeed efficient, an argument can be made that portfolio management is not necessary, as stocks are fairly priced. However, portfolio management can actually still be beneficial.
The text cites three uses of portfolio management:

- **Diversification**: selects a diversification strategy to eliminate firm-specific risk
- Reflects **tax** considerations of the individual investor
- Adjusts portfolio to reflect the **unique risk profile** of the investor

Summary

- EMH is a hypothesis that states that share prices reflect all information.
- The movement of stock prices are Random.
- Types of EMH- weak form, semi-strong form and strong form.

1. Weak form- market prices reflect all the information contained in historical price data.
2. Semi-strong form- market prices reflect all the publicly available information.
3. Strong form- market prices reflect all information, whether or not it is publicly available.

- Technical analysis is a trading discipline employed to evaluate investments and identify trading opportunities by analyzing statistical trends gathered from trading activity, such as price movement and volume.
- Fundamental analysis is the analysis of a business's financial statements, health, and market
- Technical analysis may be contrasted with fundamental analysis, which focuses on a company's financials rather than historical price patterns or stock trends.

Summary

- Two types of Investment style- Active and Passive
- Active requires continuous rebalancing and is weak form efficient
- Passive style is a buy and hold strategy and is strong and semi-weak form efficient.

- Market anomalies arenot violations of market efficiency but are due to the methodologies used in the tests of market efficiency.

- Often there is under/over reaction in the market however these reactions are corrected over a period of time ensuring efficiency.

- If markets are efficient, portfolio management isn't required but it has some advantages like diversification, tax-saving and uniqueness. So proves to be important.

Question

CT8, March 2018, Q2

Discuss the following in the context of EMH:

i) In the strong form of efficient market, rules pertaining to company employees and management over ban in stock trading eliminates benefit from insider trading

ii) Can technical analysis be applied in semi strong form of efficient market?

iii) In semi strong form of efficiency, information level differs for different group of investors or institutions

Solution

i) The strong form of EMH suggests that the market prices incorporate all information, both publically available and also that is available only to insiders. If this exists, then even with insider information, the investors won't be able to generate higher returns. Hence, any such rules pertaining to company employees and management over ban in stock trading would be unnecessary in a strong form of market.

ii) The semi strong form of market is said to be in existence if the market prices incorporate all publically available information. The technical analysis relies on making trading rules based on historical price data to generate higher investment returns. Since in semi strong form of market, the prices already incorporate all public information, technical analysis won't help investors generating any additional returns.

iii) In semi strong form of market, prices already incorporate all publically available information. However, the extent of public information might vary from investor to investor. For instance, different stock exchanges having different disclosure requirements are expected to have different levels of public information and hence, efficiency. In addition, there could be additional costs involved in obtaining the public information accurately and quickly which otherwise would dilute the market efficiency.

Thank You