EFFICIENT MARKET HYPOTHESIS

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2 CAPITAL MARKET THEORY

- Capital market theory springs from the notion that:
  - People like return
  - People do not like risk
  - Dispersion around expected return is a reasonable measure of risk

3 EFFICIENT MARKET HYPOTHESIS (FAMA)

- Definition: Intrinsic/Fundamental Value of a security is the PV of its Expected Cash Flows.
- Types of Efficiency
- Forms of Efficiency
  - Weak Form
  - Semi-Strong Form
  - Strong Form
- Semi-Efficient Market Hypothesis
- Security Prices and Random Walks

4 DEFINITION

- The **efficient market hypothesis (EMH)** is the theory supporting the notion that market prices are in fact fair
  - Under the EMH, security prices fully and fairly (i.e., without bias) reflect all available information about the security
  - Since the 1960's, the EMH has been perhaps the most important paradigm in finance
  - Whether markets are efficient has been extensively researched and remains controversial

5 TYPES OF EFFICIENCY

- **Operational efficiency** measures how well things function in terms of speed of execution and accuracy
  - It is a function of the number of orders that are lost or filled incorrectly
  - It is a function of the elapsed time between the receipt of an order and its execution

TYPES OF EFFICIENCY (CONT'D)

- **Informational efficiency** is a measure of how quickly and accurately the market reacts to new information
  - This is the type of efficiency with which the EMH is concerned
  - The market is informationally very efficient
    - Security prices adjust rapidly and fairly accurately to new information
    - However, as we've already seen, the market is still not completely efficient

7 FORMS OF MARKET EFFICIENCY

- Eugene Fama's original formulation of the Efficient Market Hypothesis established three forms of market efficiency, based on the level of information reflected in security prices:

1. **Weak form** = prices reflect all past market level (price and volume) information
2. **Semi-strong form** = prices ***also*** reflect all publicly available fundamental company and economic information
3. **Strong form** = prices ***also*** reflect all privately held information that would affect the value of the company and its securities

8 DEFINITION

- The *weak form* of the EMH states that it is impossible to predict future stock prices by analyzing prices from the past
  - The current price is a fair one that considers any information contained in the past price data
  - Charting techniques or or Technical analysis are of no use in predicting stock prices
  - All past information have been priced into the security, so with past prices we can not estimate/forecast the future prices to make "money". Only way to outperform an efficient market is by accepting a higher level of risk.
  - An investor should earn a return consistent with the risk taken, and. no stock is priced too cheaply or too expensively as compared to its fundamental value.

9 CHARTING OR TECHNICAL ANALYSIS

- People who study charts are **technical analysts** or **chartists**
  - Chartists look for patterns in a sequence of stock prices
  - Many chartists have a behavioral element
  - Weak form of efficiency suggests that there is no need for technical analysis based on historical data in contrast to the fundamental analysis to determine the value of the company and its share price.

SEMI-STRONG FORM

- The *semi-strong form* of the EMH states that security prices fully reflect all publicly available information
  - e.g., past stock prices, economic reports, brokerage firm recommendations, investment advisory letters, etc.
  - All publicly available information is already factored into the stock prices and their movements. Hence, it is useless to stock price movements to separate ”winners” and “losers”
  - Still, insider trading (acting on “private” information about the company’s genuine or fundamental value) can help earn abnormal returns beyond what the market expects.

SEMI-STRONG FORM (CONT'D)

- Academic research supports the semi-strong form of the EMH by investigating various corporate announcements, such as:
  - Stock splits
  - Cash dividends
  - Stock dividends
  - Examined through "event studies"
- This means investors are seldom going to beat the market by analyzing public news

SEMI-STRONG FORM (CONT'D)

- Market seems to do a relatively good job at adjusting a stock's valuation for certain types of new information
  - Determining how much the new info. will change the stock's value and then adjusting the price by an equivalent amount

  $\Rightarrow$ This is what event studies examine

- But it does seem to have problems developing an overall valuation for a stock in the first place
  - E.g., What is the correct value for IBM as a whole is a very difficult question to answer, but how much IBM's value should change if it is awarded a specific new contract is much easier to determine

SEMI-STRONG FORM (CONT'D)

- Burton Malkiel points out that two-thirds of professionally managed portfolios are consistently beaten by a low-cost index fund
  - Suggests that securities are accurately priced and that in the long run returns will be consistent with the level of systematic risk taken
    - Supports semi-strong form of the EMH
  - Also would suggest that portfolio managers do not possess any private information that is not already reflected in security prices
    - Supports the strong form of the EMH

14 STRONG FORM

- The *strong form* of the EMH states that security prices fully reflect all relevant public and private information
- This would mean even corporate insiders cannot make abnormal profits by using *inside information* about their company
  - **Inside information** is information not available to the general public

SEMI-EFFICIENT MARKET HYPOTHESIS

- The **semi-efficient market hypothesis (SEMH)** states that the market prices some stocks more efficiently than others
  - Less well-known companies are less efficiently priced
  - The market may be tiered
  - A security pecking order may exist
  - Lynch prefers stocks that "the analysts don't follow … and the institutions don't own …"
  - See the Small Firm and Neglected Firm Effects discussed later

16 SECURITY PRICES AND RANDOM WALKS

- The unexpected portion of news follows a **random walk**
  - News arrives randomly and security prices adjust to the arrival of the news
    - We cannot forecast specifics of the news very accurately

17 ANOMALIES

- Definition
- Low PE Effect
- Low-Priced Stocks
- Small Firm and Neglected Firm Effect
- Market Overreaction
- Value Line Enigma
- January Effect

ANOMALIES (CONT'D)

- Day-of-the-Week Effect
- Turn-of-the Calendar Effect
- Persistence of Technical Analysis
- Behavioral Finance
- Joint Hypothesis Problem
- Chaos Theory

19 DEFINITION

- A financial *anomaly* refers to unexplained results that deviate from those expected under finance theory
  - Especially those related to the efficient market hypothesis

VALUE ANOMALY: LOW PE EFFECT

- Stocks with low PE ratios provide higher returns than stocks with higher Pes and hence, outperform the market.
  - And similarly for high P/B (hence lower Book/Market) stocks
- Supported by several academic studies
- Conflicts directly with the CAPM, since study returns were risk-adjusted
- Related to both semi-strong form and weak form efficiency

21 LOW-PRICED STOCKS

- Stocks with a "low" stock price earn higher returns than stocks with a "high" stock price
- There is an **optimum trading range**

SMALL FIRM AND NEGLECTED FIRM EFFECTS

- Small Firm Effect
- Neglected Firm Effect

SMALL FIRM EFFECT

- Investing in firms with low market capitalization will provide superior risk-adjusted returns
- Supported by academic studies
- Implies that portfolio managers should give small firms particular attention

MARKET OVERREACTION

- The tendency for the market to overreact to extreme news
  - Investors may be able to predict systematic price reversals
- Results because people often rely too heavily on recent data at the expense of the more extensive set of prior data

25 THE VALUE LINE ENIGMA

- Value Line (VL) publishes financial information on about 1,700 stocks
- The report includes a timing rank from 1 down to 5
- Firms ranked 1 substantially outperform the market
- Firms ranked 5 substantially underperform the market
- Victor Niederhoffer refers to Value Line's ratings as "the periodic table of investing"

26 THE VALUE LINE ENIGMA

- Changes in rankings result in a fast price adjustment
- Some contend that the Value Line effect is merely the unexpected earnings anomaly due to changes in rankings from unexpected earnings
- Nonetheless, Value Line's successful record is evidence in support of the existence of superior analysts who apparently possess private information

JANUARY EFFECT

- Stock returns are inexplicably high in January: investors sell "winners"stocks in december to incur year-end capital gains taxes in **December.**
- Small firms do better than large firms early in the year
- Especially pronounced for the first five trading days in January

JANUARY EFFECT (CONT'D)

- Possible explanations:
  - Tax-loss trading late in December (Branch)
  - The risk of small stocks is higher early in the year (Rogalski and Tinic)

JANUARY RETURNS BY TYPE OF FIRM

	Average January return	Average January return minus average monthly return in rest of year	Average January return after adjusting for systematic risk
S&P 500 Companies			
Highly Researched	2.48%	1.63%	-1.44%
Moderately Researched	4.95%	4.19%	1.69%
Neglected	7.62%	6.87%	5.03%
Non-S&P 500 Companies			
Neglected	11.32%	10.72%	7.71%

Source: Avner Arbel, "Generic Stocks: The Key to Market Anomalies," *Journal of Portfolio Management*, Summer 1985, 4–13.

DAY-OF-THE-WEEK EFFECT

- Mondays are historically bad days for the stock market
- Wednesday and Fridays are consistently good
- Tuesdays and Thursdays are a mixed bag

DAY-OF-THE-WEEK EFFECT (CONT'D)

- Should not occur in an efficient market
  - Once a profitable trading opportunity is identified, it should disappear
- The **day-of-the-week effect** continues to persist
- However – there are confounding effects between the levels and the volatilities of returns across different days

TURN-OF-THE-CALENDAR EFFECT

- The bulk of the return comes from the last trading day of the month and the first few days of the following month
- For the rest of the month, the ups and downs approximately cancel out

PERSISTENCE OF TECHNICAL ANALYSIS

- *Technical analysis* refers to any technique in which past security prices or other publicly available information are employed to predict future prices
- Studies show the markets are efficient in the weak form
- Literature based on technical techniques continues to appear but should be useless

34 BEHAVIORAL FINANCE

- Concerned with the analysis of various psychological traits of individuals and how these traits affect the manner in which they act as investors, analysts, and portfolio managers
- Growth companies will usually not be growth stocks due to the ***overconfidence*** of analysts regarding future growth rates and valuations
- Notion of "***herd mentality***" of analysts in stock recommendations or quarterly earnings estimates is confirmed

ARE MARKETS RATIONAL?

- This question always faces a ***joint hypothesis*** problem:
  - Tests of EMH are always **dual** tests of **both** market efficiency and the specific asset-pricing model assumed
  - Market efficiency
    - Is the stock's price equal to its true value?
  - Asset pricing model used (CAPM, APT, etc.)
    - What ***is*** the stock's ***true*** value?
    - Never known for sure
    - "The question of value presupposes an answer to the question, of value to whom, and for what?" – Ayn Rand
    - E.g., the value of Apple stock would be different to Steve Jobs than to any other investor

ARE MARKETS RATIONAL?

- Related issue – what is *information*?
  - "Information is that which causes changes" – Claude Shannon (father of information theory)
  - So, if something causes the markets to move, then by definition, it must be information, and vice versa
  - From this perspective, the market is neither efficient nor inefficient, it just *is*
- So, are the markets efficient or rational?
  - Ultimately, difficult to answer categorically
  - Key question is not whether or not the markets are efficient – this is a side issue – but how investors should act, given how the markets work