

Financial Economics and the Psychology of Investing

FN 451



Our Class Today

- Efficient markets and asset pricing
- Comparing two different approaches EMH vs BF
- Psychology and investments
 - Loss aversion
 - Representativeness
 - Anchoring
 - Overconfidence
- Event study



2

WHAT IS MARKET EFFICIENCY?



3

The classic taxonomy of EMH (Roberts (1967))

- **Weak form efficiency:** The information set includes **only the history** of prices or returns.
 - How well do past returns predict future returns?
- **Semi-strong form efficiency:** The information set includes all (public) information **known to all** market participant
 - How quickly do security prices reflect public information announcement?
- **Strong-form efficiency:** The information set includes all information **known to any** market participants.
 - Do investors have any private information that is not fully reflected in prices?

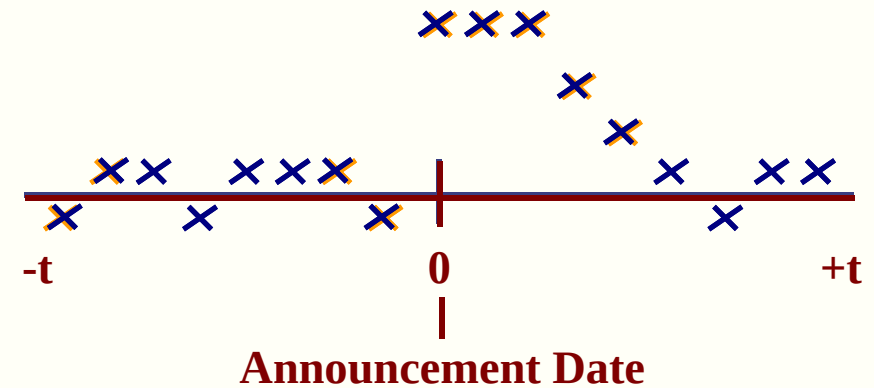


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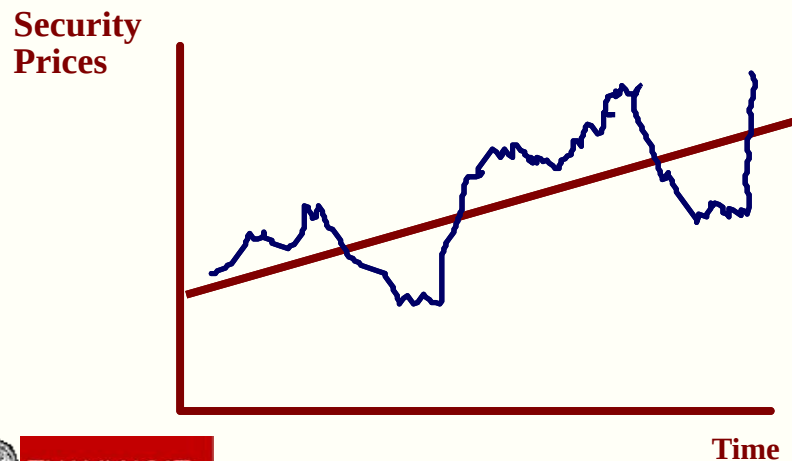
Implication of EMH information availability

- If Weak-form of the hypothesis is valid:
 - Technical analysis or charting becomes ineffective. You won't be able to gain abnormal returns based on it.
- If Semi-strong form of the hypothesis is valid:
 - No analysis will help you attain abnormal returns as long as the analysis is based on publicly available information.
- If Strong-form of the hypothesis is valid:
 - Any effort to seek out insider information to beat the market are ineffective because the price has already reflected the insider information. Under this form of the hypothesis, the professional investor truly has a zero market value because no form of search or processing of information will consistently produce abnormal returns.

Return response to positive news



Random walk and the EMH



**WHY DO WE CARE ABOUT
MARKET EFFICIENCY**

Why do we care about capital market efficiency?

- Implications on price pattern, return, and risk
 - Price response to news
 - Memory-less price movement
 - Expected return and risk
- Implications on the role of market participants
 - As an analyst
 - As an investment manager/portfolio manager
 - As a corporate financial manager

Implications on the role of market participants

- As an analyst:
 - If market is **strong** form efficient, what is your **marginal** contribution for the securities firm that hire you?
 - It should be zero, because you are not able to spot mispriced securities to produce additional increment of return on the portfolios that you are managing.
 - Analysts' **total** contribution to the society should be big. Because in scouting the capital market, they essentially make sure asset prices are effective as signals to others.
- If the market is truly efficient
=> $0 < \text{Total contribution} \neq \text{marginal contribution} = 0$

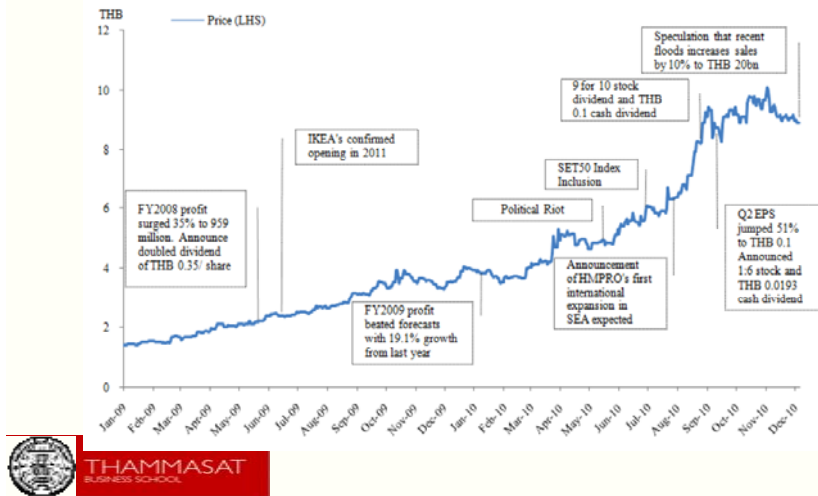
Implications on the role of market participants

- As an investment manager
 - Investment decisions of the managers of any firms are based to a large extent on signals they get from the capital market.
 - If the market is **strong** form efficient, the cost of acquiring capital will accurately reflect the prospects for each firm.
 - This means the firms with the most attractive investment opportunities will be able to obtain capital at a fair price which reflects their true potential.
 - The “right” investment will be made, and the society is said to be “allocationally-efficient”. Everyone's better off.

Implications on the role of market participants

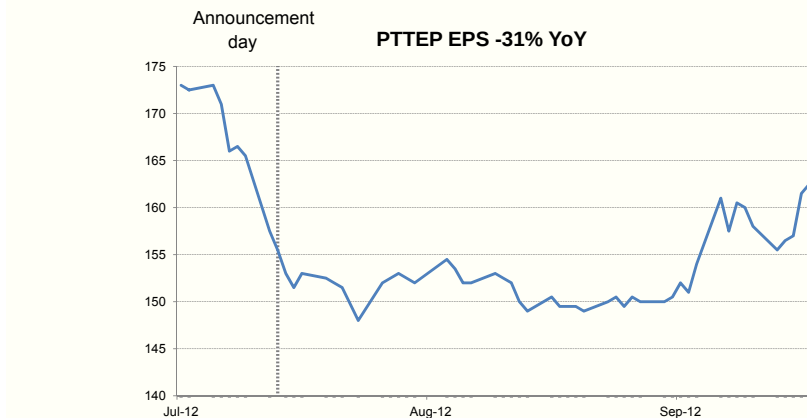
- As a corporate financial manager
 - To raise capital, you consider getting debt- or equity-financing.
 - If the market is **strong** form efficient, you know that equity-financing requires a rate of return which is “fair” because the price has already reflected all available information.
 - If the market is efficient, you would never feel your firm's stock being under- or over-valued at any point in time. In essence, there is no timing decision to issuing equity.
 - More profoundly, if market is efficient, every alternative way of raising capital would require the same rate of return for the same project. And no one capital-raising method is superior than the other.

HMPRO price response to news

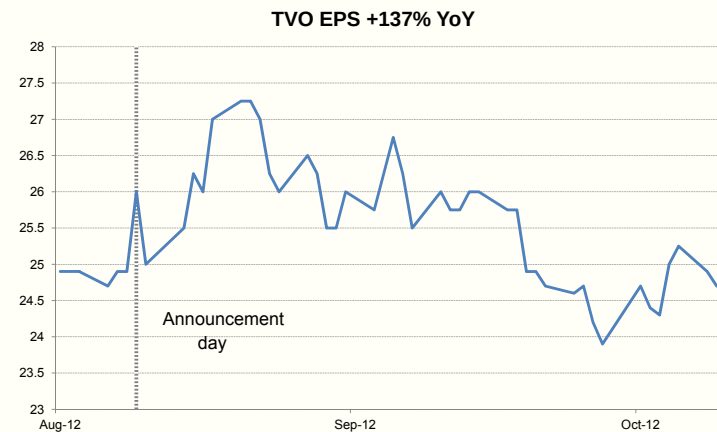


EMPIRICS ON PRICE RESPONSE TO NEWS

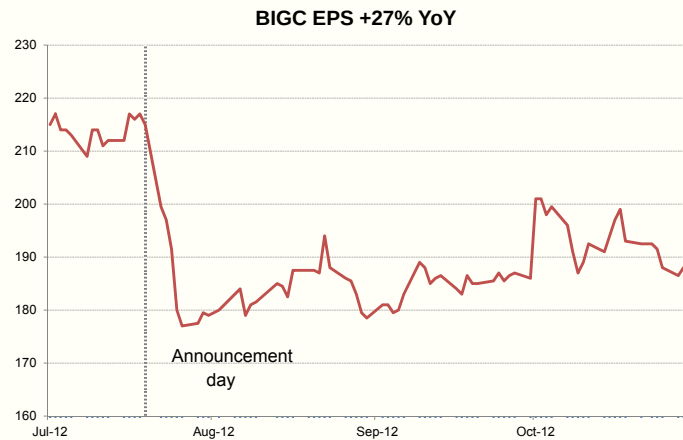
Earnings Announcement & Stock Price



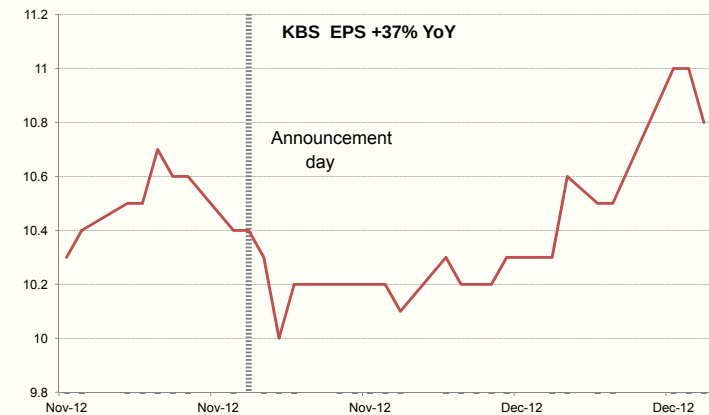
Earnings Announcement & Stock Price



Earnings Announcement & Stock Price



Earnings Announcement & Stock Price



Market Conditions under EMH and Market Conditions Observed

EMH Market

- Information is readily available, accurate and comes at no cost.
- No transaction costs
- No limits to arbitrage

Observed market conditions

- Information is costly and can be inaccurate.
- Transaction costs not zero.
- There are limits to arbitrage

OBSTRUCTIONS TO INFORMATION EFFICIENCY

Key causes

- Behavioral bias
- Market frictions

The representative investor in two different paradigms

EMH assumptions

- Homogeneous
- Choice over uncertainty based on expected utility theorem
- Bayesian learning
- Independence

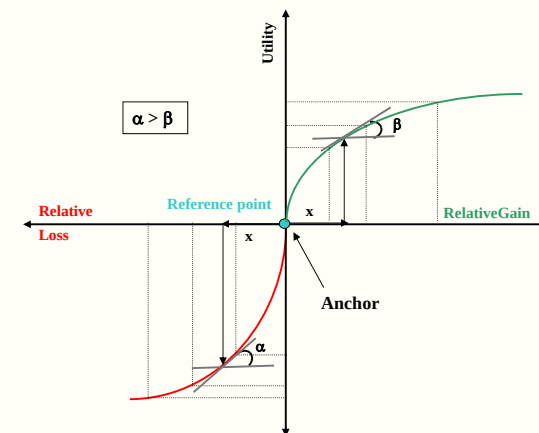
BF assumptions

- Heterogeneous
- Choice over uncertainty exhibits loss aversion or fear of regret
- Behavioural Heuristics & Decision Making Biases
 - Representativeness
 - Anchoring
 - Overconfidence
 - Framing
- Social pressure to conform
 - Herding

Prospect Theory

- Proposed by two psychologists: Daniel Kahneman and Amos Tversky.
- Gambles are evaluated relative to a **reference point**.
- Decision maker analyzes “gains” and “losses” differently.
- Incremental value of a loss is larger than that of a loss.
 “the hurt of a \$1000 loss is more painful than the benefit of a \$1000 gain”.

Prospect Theory Value Function



Investment choices

- Q1: Choose one of the following investment choices:
 - Opportunity 1:
 - Win \$100,000 with probability 0.1
 - Lose \$1.11 with probability 0.9
 - Opportunity 2:
 - Win \$39,996 with probability 0.5
 - Lose \$19,998 with probability 0.5

Prospect Theory and Investor Behaviour

- Why lottery tickets sell and why casino is good business
- Tendency to sell winners too soon and hold on to losers too long.

Prospect Theory and Investment Applications

- Investigate client's loss aversion:
 - What is the client's reference point of regret?
 - What is the client's mental compartments? Investors have a "safe" part of their portfolio that they will not risk, and a "risky" part of their portfolio that they can have fun with
- Lower moment portfolio selection
- Downside risk betas
- Use derivatives to protect downside losses
 - Protective puts for equity indices
 - Interest Collars

Representativeness

- Using familiarity to make judgements.
 - Gambler's Fallacy
 - Underweighting base rate information

Gambler's Fallacy

- Investors may apply law of large numbers to small sequences.

Example: fair coin tossing.

THHTHTHHHHHH $\rightarrow P(T) = ?$, $P(H) = ?$.

- Which of the 2 sequences is more likely to occur in a fair coin tossing experiment?
 - HHHHHHHTTTTTTHHHHHH
 - HHTHTHHTTHTHTHTTH



29

Base rate probabilities: Example 1

- Example 1:** Amy loves to have fun. She enjoys hanging out with friends in downtown pubs and restaurants. When she goes out, Amy dresses fashionably.
- What is Amy's profession?
 - Teacher
 - Flight attendant
- There is higher probability that Amy is a teacher. However, you may think she is a flight attendant based on observed characteristics. You are ignoring base rate probability.



30

Base Rate Probabilities: Example 2

- Example 2:** You have been called to a jury duty in a town where there are two taxi companies, Green Cabs Ltd. and Blue Taxi Inc. Green Cabs dominate the market with 85% of the taxis on the roads. On a misty winter night, a taxi sideswiped another car and drove off. A witness says it was a blue cab. The witness tested under conditions like those of the night of the accident and 80% of the time she correctly identifies the colour of the cab that is seen. That is regardless of whether she is shown a blue cab or a green cab, she gets the colour right 80% of the time.



31

Base Rate Probabilities: Example 2

- What do you conclude based on this information?
 - The probability that the sideswiper was Blue is 80%.
 - It is more probable that the sideswiper was Blue, but the probability is less than 80%.
 - It is just as probable that the sideswiper was Green as it was Blue.
 - It is more likely than not that the sideswiper was Green



32

Base Rate Probabilities: Example 2

- According to Kahneman and Tversky's studies:
- Most people think the swiper was Blue.
- Bayes' Theorem says "Green"
- Base Rate Fallacy: People ignore the fact that most of the cabs in town are Green and focus on the witness.

Applying Bayes' Theorem

- Define probability of events
- $P(G)$ = Probability the taxi is green = 0.85
- $P(B)$ = Probability the taxi is blue = 0.15
- $P(W|B)$ = Conditional probability that witness identifies taxi is blue correctly = 0.8
- We need to compute $P(B|W)$.

Bayes' Theorem

$$P(B|W) = \frac{P(B \cdot W)}{P(W)} = \frac{P(B)P(W|B)}{P(B)P(W|B) + P(G)P(W|G)}$$
$$= \frac{(0.15)(0.8)}{(0.15)(0.8) + (0.85)(0.2)} = 0.41$$

Note that $P(G|W) = 0.59$

IT IS MORE LIKELY THAT THE TAXI IS GREEN!

Representativeness and Investor Behaviour

- Extrapolative expectations about asset prices.
- Analysts tend to overestimate (underestimate) firms that have shown recent strong (weak) earnings performance.

What to do with representativeness?

- Make use of historical data for better estimate of subjective probabilities.
- Look before you leap into big investment decisions based on “rule-of-thumb” estimates.

Anchoring and investor behaviour

- People form estimates based on some initial arbitrary values.
- Examples
 - Stock price reversals
 - Use of benchmark market or industry P/E
 - Charting tools such as “head and shoulders.”

What to do with anchoring?

- Clients likely to prefer limit and range orders.
- Good technical analysis should be based on good statistics.

Overconfidence and behaviour

- People are overconfident in their judgements leading to overreaction or underreaction to news events.
- Examples:
 - Males earn lower net returns (after transaction costs) than females because they trade more aggressively. (Barber and Odean (2001))
 - Volatility of longer term options move almost in lockstep with short term ones indicating that market puts too much focus on short-term innovations. (Stein 1989)
 - Confident of Asian growth opportunities, management of many Asian companies are overleveraged and expanded aggressively prior to crisis in mid-1997.
 - Underreaction of earnings announcements leads to empirical evidence on earnings announcement drift.

Dealing with overconfidence

- Overconfidence definitely has impact on financial markets but still unclear how to quantify magnitude.
- Be sure to analyze worse case scenario and avoid focus only on upside.

Herding

- Uncertainty induces imitative behaviour.
- This is a game where everybody believes he has inferior information relative to the others.
- Examples:
 - Mutual fund investment in similar stocks
 - Stock analysts tend to converge to the mean when they forecast earnings.
 - Excessive issuance of junk bonds by US companies in 1980s.

Dealing with herding

- Putting your money in different mutual funds may not give you the diversification you really want.
- If you decide to herd, be sure to get on the train early and get off it before trends reverse.

Repercussions on corporate decision making

- Perfect markets
 - Timing the market in bond and equity issues is irrelevant as the market acknowledges true value of firm.
 - The cost of capital accurately measures the firm's risk and quality of management.
 - Dividends are paid when the firm cannot earn minimum required rate of return to investors.
- Imperfect markets
 - Market timing is important.
 - The market does not know your type so firms need to signal that they're good.
 - Minimum dividend payout may be necessary as shareholders cannot observe management effort and firm investment opportunity sets.

Repercussions on investment and asset pricing

- Perfect markets: Assets are priced correctly. Mutual funds perform equally well. Investors use full and complete information set to arrive to investment decisions.
- Imperfect markets: Investor sentiment creates disturbances to efficient prices. Limitations to arbitrage does not counter irrational disturbances.
 - Analyze the worse case scenario avoid focus on upside.
 - Investors hold on losers and sell winners so stop loss orders are helpful.
 - People have “mental compartments” and so they hedge not against risk of future cash flows but against risk of a particular transaction.
 - Dutch auctions or open IPOs can create a better market clearing price.
 - Charting can help time purchase or sale of your investments because of anchoring.

Conclusion for investment professionals and policy makers

For investment professionals

- It is possible to beat the market with good timing by taking advantage of psychological anomalies.
- Solid empirical analysis improves portfolio management performance and reduce chances of loss.
- Must learn to adapt to changing anomalies.

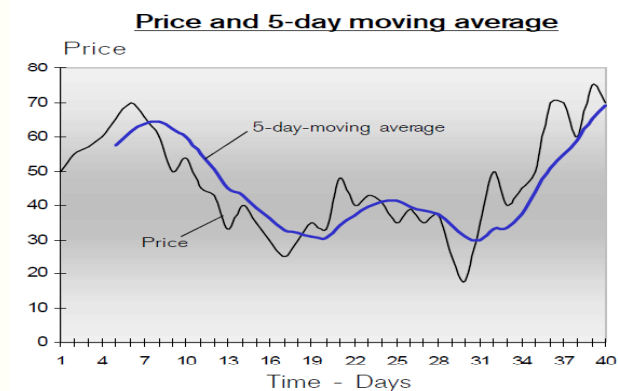
For policy makers

- It may be in the best market interest to curb short-term speculative trading.
- Fund advertising, financial disclosures and reporting should be regulated for fair and accurate dissemination of information.
- Protection of individual investors is important.

TESTING MARKET EFFICIENCY

Computer exercise

- Technical analysis: Moving averages



Empirical tests of market efficiency

- Event studies
- Tests patterns in the stock market
- Testing some trading rules
- Assessing performance of professional managers



Event studies

- Measure unexpected return that results from an informational event such as
 - Surprise earnings announcements
 - Mergers and acquisitions
- A firm's return consists of a component related to fundamental risks and firm specific component

$$r_t = a + br_{mt} + e_t$$



Event studies

1. Examine prices and returns over time
2. Returns are adjusted to determine if they are abnormal.

Use Market model or other return models such as the Fama French three-factor model

a. $r_t = a_t + b_{trmt} + e_t$
(Expected Return)

b. Excess Return =
(Actual - Expected)
 $e_t = \text{Actual} - (a_t + b_{trmt})$

c. Cumulate the excess returns over time:



Event studies

- We use cumulative abnormal returns (CAR) over an event window to identify how information is incorporated in stock prices

$$CAR = \sum_{t=1}^k e_t$$

- If there is no new information CAR moves around 0



Homework

- MSCI announced on November 12, 2012 that the following stocks on the SET namely BGH, CPN, and MAKRO has been included in the computation of its constituents index. Compute the CAR for period $[-2, 5]$. Do you detect any interesting pattern? Analyze what you observe. Use excel file careexercise.xls