# Market Efficiency

# News and Information

- Markets aggregate information brought to them by market participants.
- In an efficient market, all relevant available information is reflected in the current price.
- Market efficiency matters because prices serve as a signal for the allocation of capital.
- But what information is relevant?

# Market Efficiency

- Fama (1970) distinguishes three forms of market efficiency:
- Weak form

No investor can earn abnormal returns using the **information contained in past prices or returns**.

- Semi-strong form

No investor can earn abnormal returns using **any publicly available information**.

- Strong form

No investor can earn abnormal returns using **any information, whether the information is publicly available or not**.

# Empirical Findings

- Early Studies focused on short term horizons (daily returns)

- Economic tests of market efficiency
- - Filter rules
- If a stock goes up by 1% then buy it. Don't sell it until the stock goes down by 1%
- - Technical trading
- Based on patterns in past prices.

- Alexander (1961), and Fama and Blume (1966) find that some strategies may make money, but not after transaction costs.

- Professional money managers tend to use technical trading strategies to determine when to enter or exit a market, rather than as the primary way to earn profits.

# Empirical Findings

- More recent studies focus on longer return horizons.

- Momentum:
- Past winners tend to outperform past losers over the next 3 – 12 months.
- But, after allowing for transaction costs there is limited evidence that momentum strategies are profitable.

- Mean Reversion:
- Some evidence of long run mean reversion in stock prices over 1 – 5 year return horizons.
- - Not consistent with a random walk.
- - Fama and French (1988), and Poterba and Summers (1988).

# Empirical Findings

- January Effect:
- Returns are higher in January, relative to other months. The effect is particularly pronounced for small stocks.
- Keim (1983) – Tax loss selling by portfolio managers to realize capital losses prior to the year end. In the new year these stocks rebound as investors repurchase the stocks.
- 
- The Value Premium:
- A portfolio formed by purchasing **Value** stocks (high book-to-market) and short selling **Growth** stocks (low book-to-market) earns abnormal returns.
- Ang and Chen (2006) – This finding may be driven by statistical problems. When the models are corrected, there is little evidence of abnormal returns.

# You can’t beat the market, or can you?

- Peter Lynch
  - Managed the Fidelity Magellan Fund from 1977 to 1990
  - The fund's assets grew from $20 million to $14 billion
  - Beat the S&P 500 Index benchmark in 11 of those 13 years, achieving an annual average return of 29%.

- *“If you stay half-alert, you can pick the spectacular performers right from your place of business or out of the neighborhood shopping mall, and long before Wall Street discovers them.”*

- *“Absent a lot of surprises, stocks are relatively predictable over twenty years. As to whether they're going to be higher or lower in two to three years, you might as well flip a coin to decide.”*

- In picking stocks, Peter Lynch had several simple principles:
  - Stick to what you know and/or can easily understand
  - Understand the company
  - Ignore short term fluctuations in prices
  - Focus on a company's fundamentals
  - Invest only for the long run

# You can’t beat the market, or can you?

- Warren Buffet
  - Manager of Berkshire Hathaway
  - Investors who invested $10,000 in the company in 1965 are above the $50 million mark today

- *“Shares are not mere pieces of paper. They represent part ownership of a business. So, when contemplating an investment, think like a prospective owner.”*

- *“If, when making a stock investment, you're not considering holding it at least ten years, don't waste more than ten minutes considering it.”*

- In picking stocks, Warren Buffet has similar principles to Peter Lynch:
  - The company should have a good return on capital without a lot of debt
  - The company must be understandable
  - The company doesn't take a genius to run
  - The company must have predictable earnings
  - Invest for the long run

# Could it just be luck?

- Suppose we start with 10,000 investment managers. Each manager has a 50% probability of making $10,000 each year, and a 50% probability of losing $10,000 each year.

- If the managers ever lose money they are fired.

- How many managers do we expect to make money for 1 year?
- 5,000 (10,000 x $0.5^1$)

- How many managers do we expect to make money for 10 years?
- 10 (10,000 x $0.5^{10}$)

# Contagious Speculation and a Cure for Cancer.

Huberman and Regev
Journal of Finance, 2001

# A Cure for Cancer

# The Case of Entremed

- Entremed is a small biotech firm working on a cure for cancer.

- On Nov 28th 1997 the magazine "Nature" reported that Entremed had found very promising findings in their tests.
- Entremed made the front cover of "Nature" and was also mentioned in the New York Times.

- Evaluating this information is challenging. Biotech experts would have to weigh up what the results really mean in terms of expected future cash flows and discount rates.

- The stock price rose from $11.875 to $15.25
- Market paid attention to the news and priced it into Entremed's stock value

# No News

- On Sunday May 3rd 1998 the New York Times ran a "Special Report" on Entremed.

- The information in the report was identical to that first reported 5 months earlier.

- The report included quotes from Nobel Laureate, Dr James D Watson (allegedly):
- "Judah is going to cure cancer in two years…"

# Bad News

- Nov 12th 1998 a front page article in the Wall Street Journal featured Entremed.

- Other laboratories had failed to replicate the findings of Dr Judah Folkman and his research team.

- Entremed's analysis was not robust, and in fact they were no closer to curing cancer than they were 12 months previously.

# Market Efficiency?

- According to the efficient markets hypothesis what should have happened to Entremed's stock price after:

- 1) The New York Times Special Report on 3rd May 1998 which contained no new news.

- 2) The Wall Street Journal article on 12th Nov 1998 stating that Entremed's results could not be replicated.

# Reality

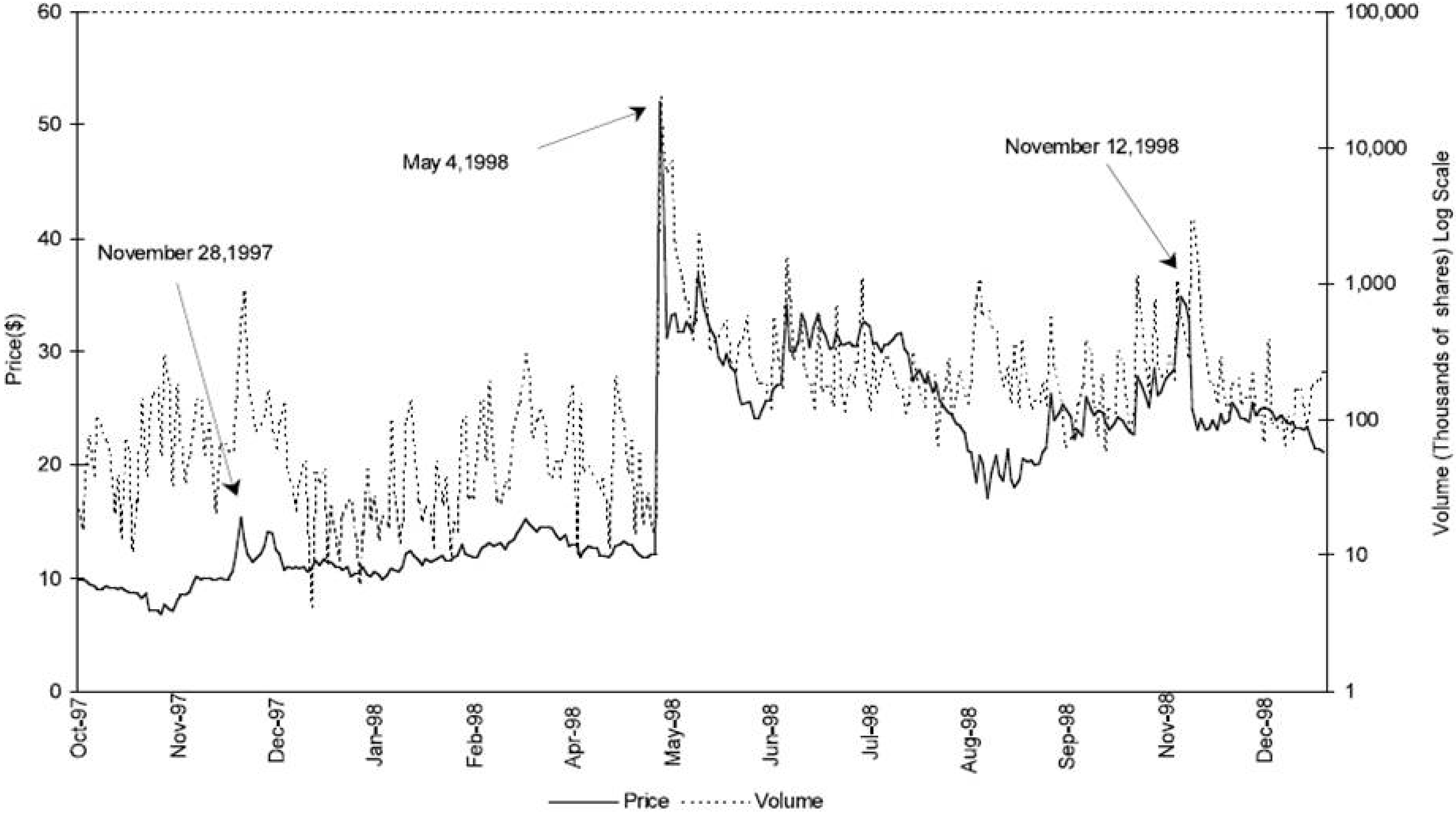



**Figure 1. ENMD closing prices and trading volume, October 1, 1997, to December 30, 1998.**

# Not just Entremed!

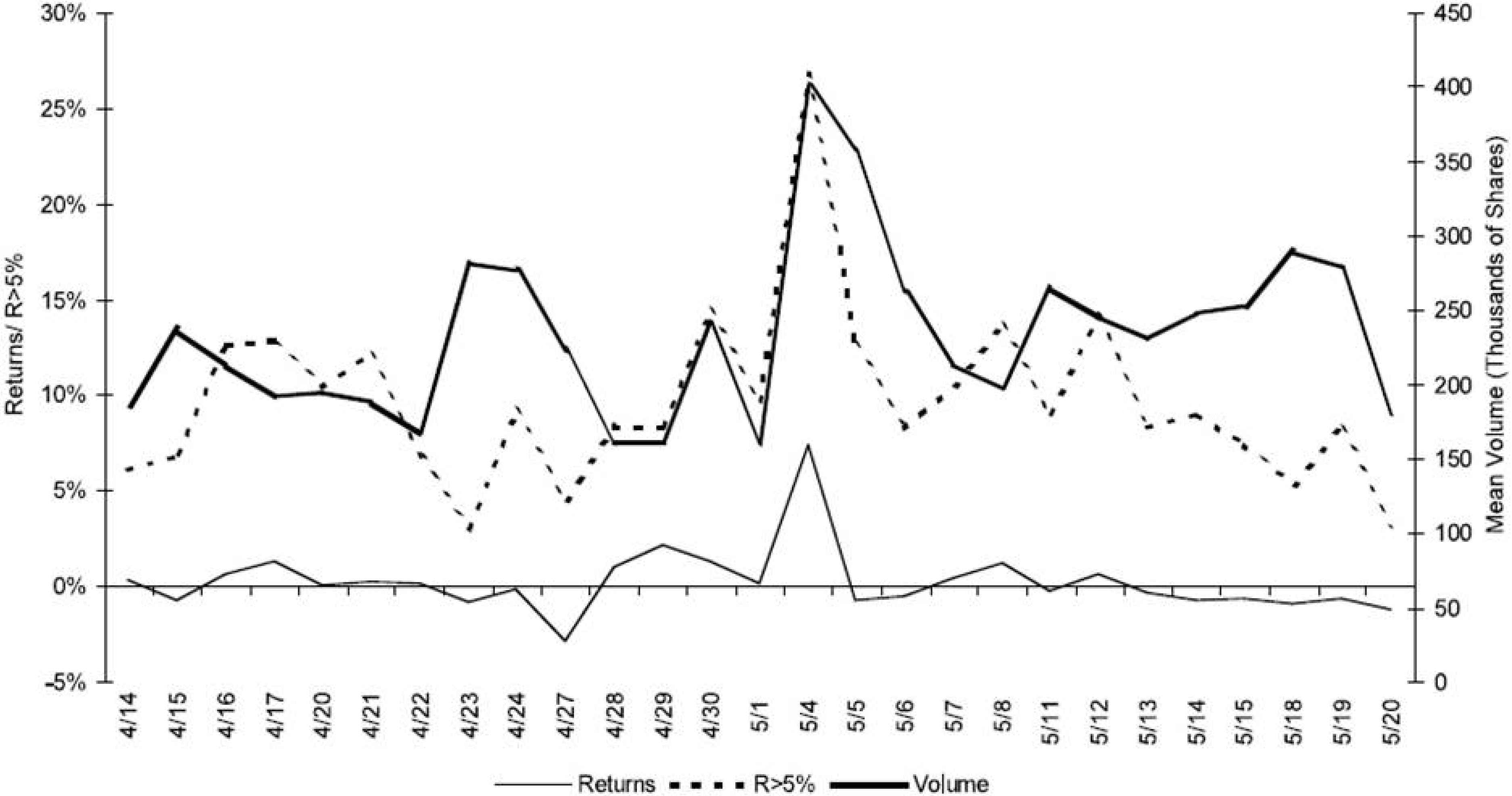



**Figure 2. Biotech Index Performance around May 4.** $R > 5\%$ is the fraction of stocks with daily return exceeding 5 percent.

# Conclusions

- In reality:
- Markets are not perfect, although most theoretical models typically assume that markets are perfect.

- Overall, the US markets are probably close to semi-strong form efficiency.

- This does not mean that all stocks are correctly priced:
- –Some stocks will be under-priced, some over-priced, and others correctly priced. **On average, stocks are correctly priced.**

- Insiders can, and do, make money using private information.

# Behavioral Finance

# Portfolio Theory and the CAPM

- Markowitz (1952) and Sharpe (1964) assumed:
  - - Investors are risk averse.
    - Investors like expected returns.
    - Investors dislike risk as measured by variance.
  - - All investors have the same estimates of expected returns, variances, and correlations.
    - Homogeneous Expectations.
  - - Investors are calculating machines who make all decisions based on maximizing expected utility.

# Is that how humans behave?

- We like to invest in companies we are familiar with.
  - - Availability: “familiarity breeds investment”.
- We like to compare current events to past events and find patterns.
  - - Representativeness: judgement based on similarity.
- TV Networks employ “experts” such as Jim Cramer to provide investment advice.
  - - Reliance on the judgement of other people.
- We often overestimate the reliability of our own knowledge.
  - - Overconfidence.

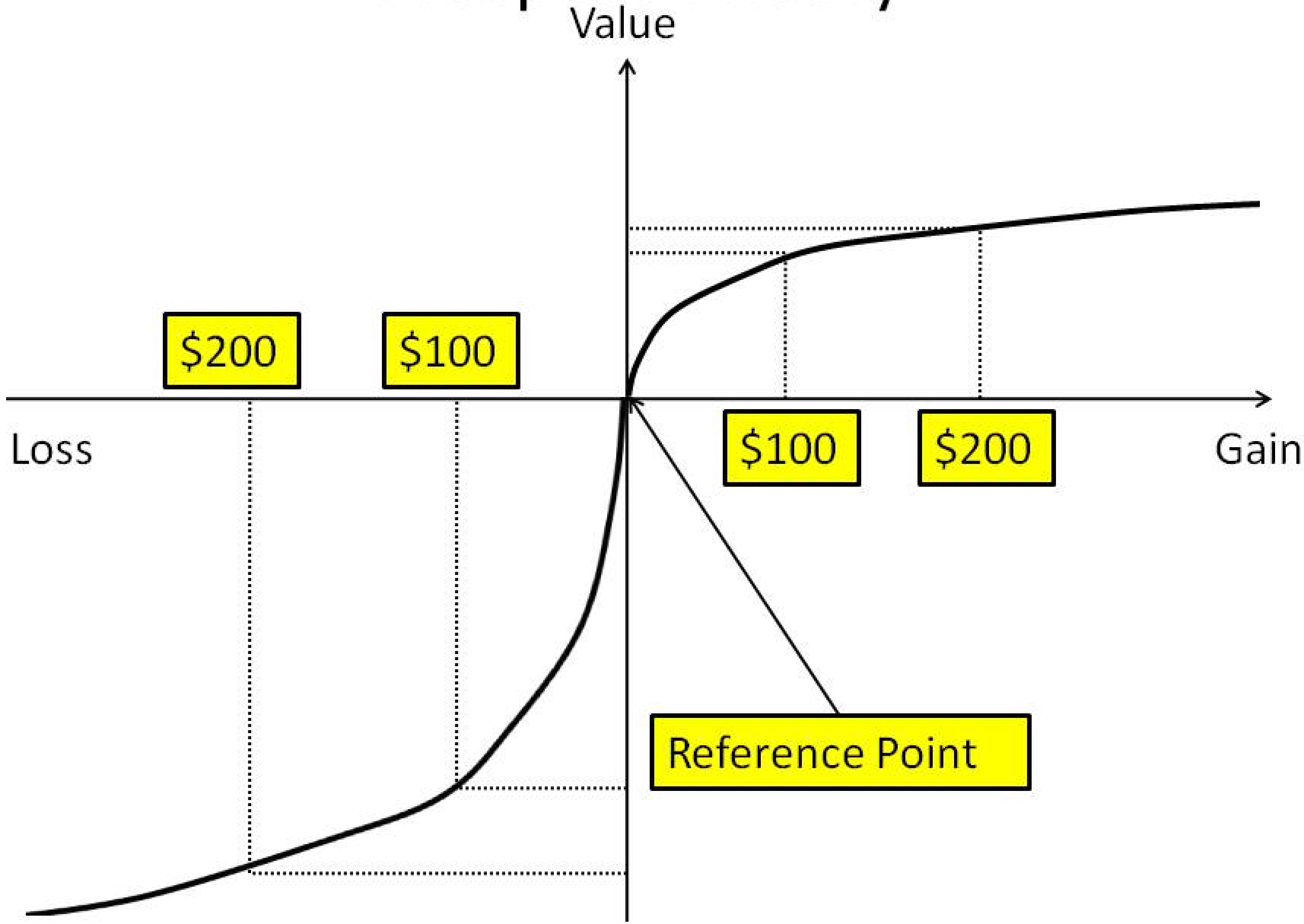
# Is that how humans behave?

- We often take into account how we will feel in the future if our decision today is a poor one. This influences our current decision.
  - - Regret Aversion.
- If our investment choices have been successful we tend to sell them to realize our profits. We tend to hold on to our bad stocks to avoid recognizing we made a bad decision.
  - - Disposition Effect.
- We tend to form strong opinions, which take a long time to adjust to new information.
  - - Anchoring and adjustment.

# Prospect Theory

- Proposed by two psychologists: Daniel Kahneman and Amos Tversky.
- 
- Reference level dependence
- An individual views consequences (monetary or other) in terms of changes from the *reference level*, which is usually that individual's *status quo*.
- Gain and loss satiation
- The mental gains/losses from a choice have the diminishing returns characteristic.
- Loss aversion
- Losing $100 produces more pain than gaining $100 produces pleasure.

# Prospect Theory



# Do these traits influence stock returns?

- There are a long list of “anomalies” in financial markets.
  - - Anomalies are observations that do not conform with rational finance theory.
    - - We will focus on 3 of the most prominent anomalies.
- Value Effect:
  - - There is a positive association between future returns and book-to-market ratios.
- Size Effect:
  - - There is a negative association between future returns and market equity.
- Momentum:
  - - Past winners tend to outperform past losers over the next 3 – 12 months.

# The Value Effect

- Past data on book-to-market equity can predict future returns.

- Behavioral Explanation:

- Growth Stocks (low book-to-market) are often the focus of investor attention.
- - Growth stocks often feature prominently in the media.
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- Value Stocks (high book-to-market) are neglected by investors.
- - Often they have performed poorly in the past, and they tend not to make the headlines.

# The Size Effect

- Small firms tend to be undervalued by investors while large firms are overvalued.

- Behavioral Explanation:
  - Small firms are not as well known, and receive less attention.
  - Small firms are perceived as being riskier firms.
  - Investors listen to analyst recommendations, yet there are few analysts covering small firms.

# Momentum

- Firms with high returns in the past, outperform firms with low returns in the past.

- Behavioral Explanation:
  - Conservatism
    - - Investors react slowly to new information.
  - Representativeness
    - - Investors believe they see a pattern based on past performance.
  - Overconfidence
    - - Investors ignore unfavorable public information.
    - - Investors pay too much attention to favorable public Info.
  - Positive Feedback
    - - Investors see their investment doing well, and make further investments.

# Behavior and Finance

- There will always be anomalies in financial markets.
- Anomalies rarely persist to foster new theories. As further research is done, anomalies tend to disappear.

– There is no overriding theory behind behavioral finance.
  - - There are many different heuristics.
  - If one doesn't work, another will.
  - - For example: Are people optimists or pessimists?
    – They can be both depending on the situation.

# Behavior and Finance

- The debate between those who favor behavioral finance and those who favor market efficiency is ongoing.
- No one disputes that investors are not perfectly rational.
- The important question is whether behavioral biases really have an impact on price determination.
  - - Not clear.

- Some economists argue that the market is 90% inefficient. Yet they acknowledge that it is very difficult to "beat the market"!
- - Investors should still hold index funds.

# Case: Hertz Corporation

- **The Hertz Corporation**, a subsidiary of Hertz Global Holdings, Inc., is an American car rental company based in Estero, Florida, that operates 10,200 corporate and franchisee locations internationally.

- Hertz Global Holdings, the parent company of The Hertz Corporation, was ranked 335th in Forbes' 2018 Fortune 500 list.As of 2019, the company had revenues of US$9.8 billion, assets of US$24.6 billion, and 38,000 employees.

- The company filed for **bankruptcy** on May 22, 2020, citing a sharp decline in revenue and future bookings caused by the COVID-19 pandemic.

| Ranking | Car Rental Company |
|---|---|
| 1 | Enterprise Rent-A-Car |
| 2 | The Hertz Corporation |
| 3 | Budget Car Rental |
| 4 | Avis Car Rental |
| 5 | Alamo Rent A Car |
| 6 | Thrifty Car Rental |

**The Hertz Corporation**

| | |
|---|---|
| Type | Subsidiary |
| Traded as | NYSE: HTZ<br>Russell 2000 Component |
| Industry | Car rental and leasing |
| Founded | Chicago, Illinois, U.S. (1918) |
| Founder | Walter L. Jacobs[1] |
| Headquarters | Estero, Florida, U.S. |
| Number of locations | 30,000 corporate and franchise between Hertz, Dollar, and Thrifty (as of 2018)[2] |
| Key people | Paul Stone (President and CEO)[3] |
| Revenue | ▲ US$9.779 billion (2019)[4] |
| Net income | ▲ US$(58) million (2019)[5] |
| Total assets | ▲ US$24.627 billion (2019)[6] |
| Total equity | ▲ US$1.888 billion (2019)[7] |
| Owner | Hertz Global Holdings, Inc. |
| Number of employees | ~38,000[8] |

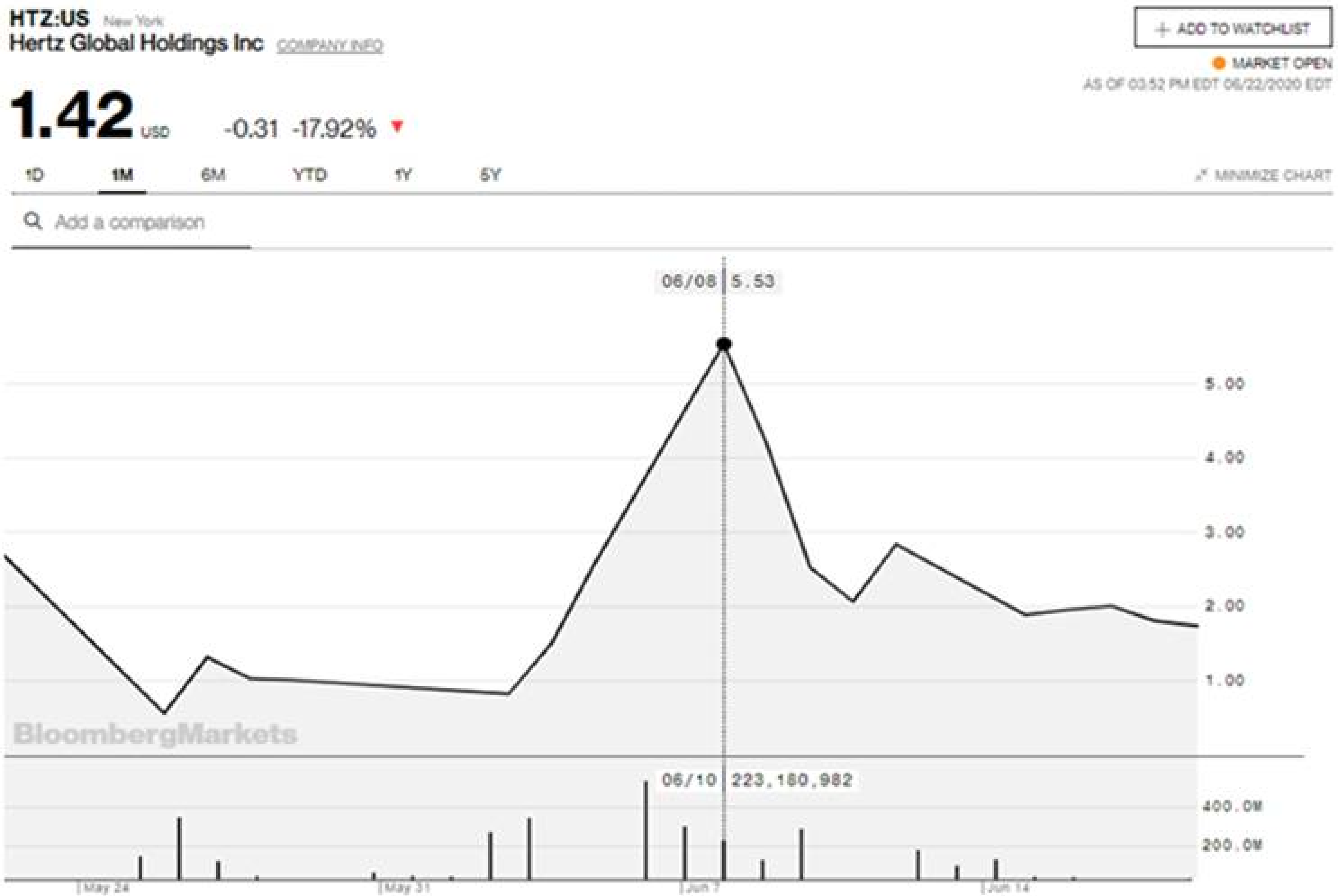
# Hertz files for bankruptcy

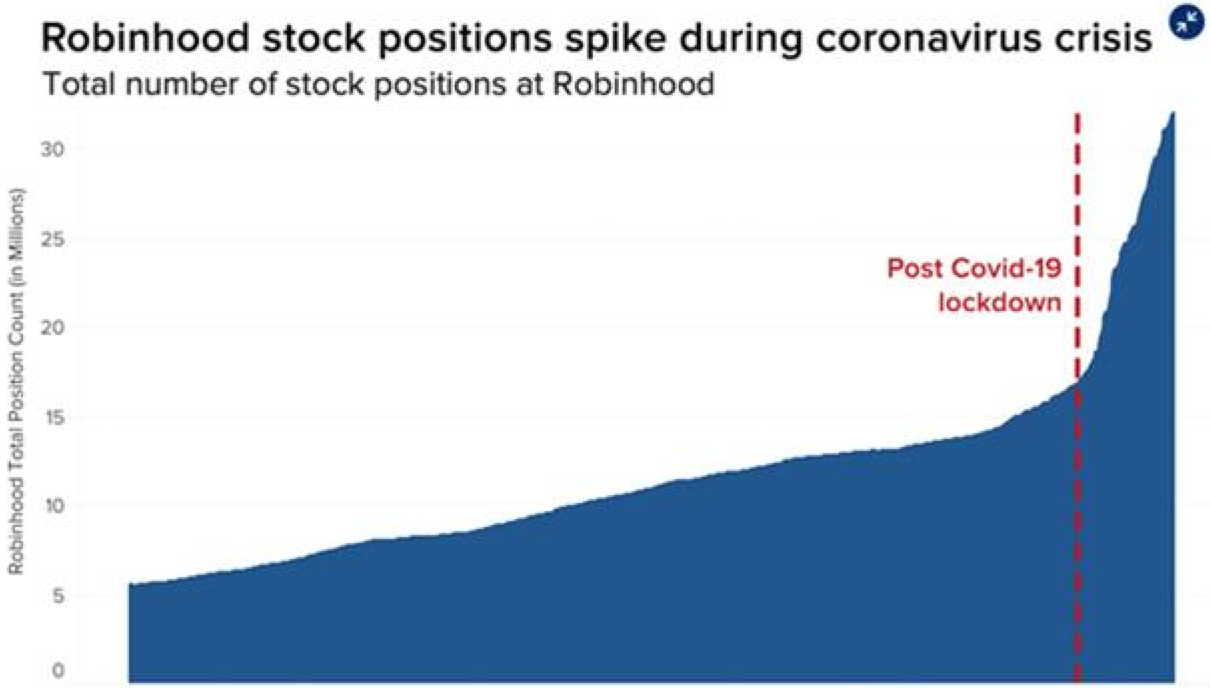
- Despite the bankruptcy filing, Hertz announced on June 11 that it is seeking to raise up to $1 billion in new equity (with disclaimers that there is a "risk that the common stock could ultimately be worthless").

- The Wall Street Journal characterized the potential stock sale as a "seemingly unprecedented move for a large bankrupt company eager to capitalize on market anomalies," as its stock price rose nearly 1000% to $5.50 a share, from a low of 59 cents after its bankruptcy filing.

- Hertz's stock has been heavily traded by retail investors, becoming one of the most-traded stocks in trading apps such as Robinhood.

# Why? Remember, Hertz owed the debt holders around $0.4 per shares.






**Filed pursuant to Rule 424(b)(5)**
**Registration Statement No. 333-231878**

**PROSPECTUS SUPPLEMENT**
**(To prospectus dated June 12, 2019)**

Hertz

## Hertz Global Holdings, Inc.

**Up to $500.0 million**
**Common Stock**

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We have entered into an Open Market Sale Agreement[SM], or sales agreement, with Jefferies LLC, or Jefferies, dated June 15, 2020, relating to the sale of our common stock offered by this prospectus supplement. In accordance with the terms of the sales agreement, under this prospectus supplement we may offer and sell our common stock, par value $0.01 per share, having an aggregate offering price of up to $500.0 million from time to time through Jefferies, acting as our agent.

# Worthless common stock

***We are in the process of Chapter 11 reorganization cases under the Bankruptcy Code, which may cause our common stock to decrease in value, or may render our common stock worthless.***

As previously disclosed, on May 22, 2020, we filed voluntary petitions under Chapter 11 of the Bankruptcy Code in the Bankruptcy Court, thereby commencing the Chapter 11 Cases for certain debtors, including Hertz Global Holdings, Inc. The price of our common stock has been volatile following the commencement of the Chapter 11 Cases and may decrease in value or become worthless. Accordingly, any trading in our common stock during the pendency of our Chapter 11 Cases is highly speculative and poses substantial risks to purchasers of our common stock. As discussed below, recoveries in the Chapter 11 Cases for holders of common stock, if any, will depend upon our ability to negotiate and confirm a plan, the terms of such plan, the recovery of our business from the COVID-19 pandemic, if any, and the value of our assets. Although we cannot predict how our common stock will be treated under a plan, we expect that common stock holders would not receive a recovery through any plan unless the holders of more senior claims and interests, such as secured and unsecured indebtedness (which is currently trading at a significant discount), are paid in full, which would require a significant and rapid and currently unanticipated improvement in business conditions to pre-COVID-19 or close to pre-COVID-19 levels. We also expect our stockholders' equity to decrease as we use cash on hand to support our operations in bankruptcy. Consequently, there is a significant risk that the holders of our common stock, including purchasers in this offering, will receive no recovery under the Chapter 11 Cases and that our common stock will be worthless.

# Carl Icahn lost $2 billion betting on Hertz

- The activist investor Carl Icahn held 39% of Hertz's shares when it filed for bankruptcy on May 22, 2020, and he controlled three board seats.
- He invested a total of $2.3 billion into Hertz shares from 2014 to 2020.
- On May 26, he sold all his shares, on average, at $0.72, resulting over 2 billion loss.