# Event Studies in Finance

1111AIFQA04
MBA, IM, NTPU (M6132) (Fall 2022)
Tue 2, 3, 4 (9:10-12:00) (B8F40)

https://meet.google.com/paj-zhhj-mya

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Institute of Information Management, National Taipei University
https://web.ntpu.edu.tw/~myday

2022-10-04

# Syllabus

| Week | Date | Subject/Topics |
|---|---|---|
| 1 | 2022/09/13 | Introduction to Artificial Intelligence in Finance and Quantitative Analysis |
| 2 | 2022/09/20 | AI in FinTech: Metaverse, Web3, DeFi, NFT, Financial Services Innovation and Applications |
| 3 | 2022/09/27 | Investing Psychology and Behavioral Finance |
| 4 | 2022/10/04 | Event Studies in Finance |
| 5 | 2022/10/11 | Case Study on AI in Finance and Quantitative Analysis I |
| 6 | 2022/10/18 | Finance Theory |

# Syllabus

Week Date Subject/Topics

7 2022/10/25 Data-Driven Finance

8 2022/11/01 Midterm Project Report

9 2022/11/08 Financial Econometrics

10 2022/11/15 AI-First Finance

11 2022/11/22 Industry Practices of AI in Finance and Quantitative Analysis

12 2022/11/29 Case Study on AI in Finance and Quantitative Analysis II

# Syllabus

| Week | Date | Subject/Topics |
| --- | --- | --- |
| 13 | 2022/12/06 | Deep Learning in Finance;<br>Reinforcement Learning in Finance |
| 14 | 2022/12/13 | Algorithmic Trading; Risk Management;<br>Trading Bot and Event-Based Backtesting |
| 15 | 2022/12/20 | Final Project Report I |
| 16 | 2022/12/27 | Final Project Report II |
| 17 | 2023/01/03 | Self-learning |
| 18 | 2023/01/10 | Self-learning |

# Event Studies in Finance

# Outline

- Event Studies in Finance
- Event Studies for Financial Research
- Event Study Methodology
- Efficient Market Hypothesis (EMH)
  - Efficient Markets
  - Inefficient Markets

Doron Kliger and Gregory Gurevich (2014),

# Event Studies for Financial Research:

## A Comprehensive Guide,

Palgrave Macmillan


Source: https://www.amazon.com/Event-Studies-Financial-Research-Comprehensive/dp/1137435380/

# Event Studies in Finance

- **Event studies are widely used in finance research to investigate the implications of**
  - **Announcements of corporate initiatives**
    - Mergers and acquisitions, equity and debt issuance, dividends and repurchases, corporate restructuring
  - **Regulatory changes**
    - Board reform, compensation, changes in taxation, workplace safety
  - **Macroeconomic shocks on stock prices**
    - The COVID-19 pandemic, Brexit, the Paris Agreement

Source: El Ghoul, Sadok, Omrane Guedhami, Sattar A. Mansi, and Oumar Sy (2022). "Event studies in international finance research." Journal of International Business Studies : 1-21.

# Firm-level Event Studies

- M&As
- Restructuring
- Equity issuance
- Dividends
- Analyst forecasts and recommendations
- Earnings

Source: El Ghoul, Sadok, Omrane Guedhami, Sattar A. Mansi, and Oumar Sy (2022). "Event studies in international finance research." Journal of International Business Studies : 1-21.

# Single- and Cross-county Event Studies

## published in the four major finance and IB journals

## *Firm-level events*

| Event/sample | Single-country sample | | | | | Cross-country sample | | | | | Cross country (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | JF | JFE | RFS | JIBS | Total | JF | JFE | RFS | JIBS | Total | |
| *Firm-level events* | | | | | | | | | | | |
| M&As | 35 | 50 | 13 | 0 | 98 | 0 | 1 | 3 | 15 | 19 | 16.24 |
| Restructuring | 16 | 18 | 3 | 0 | 37 | 0 | 0 | 0 | 2 | 2 | 5.13 |
| Equity issuance | 15 | 15 | 6 | 0 | 36 | 0 | 1 | 0 | 0 | 1 | 2.70 |
| Dividends | 9 | 11 | 3 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Analyst forecasts and recommendations | 9 | 6 | 3 | 0 | 18 | 0 | 0 | 2 | 0 | 2 | 10.00 |
| Earnings | 9 | 5 | 4 | 0 | 18 | 0 | 0 | 1 | 1 | 2 | 10.00 |
| Board structure changes | 7 | 9 | 3 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Debt issuance | 4 | 9 | 3 | 0 | 16 | 0 | 1 | 0 | 0 | 1 | 5.88 |
| Investor activism and voting | 2 | 10 | 5 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Listing/delisting | 10 | 0 | 0 | 0 | 10 | 2 | 3 | 1 | 1 | 7 | 41.18 |
| Share repurchases | 5 | 9 | 1 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| News | 3 | 7 | 5 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Managerial turnover | 4 | 7 | 2 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Bankruptcy and liquidation | 6 | 3 | 2 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Managerial compensation | 4 | 6 | 1 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Credit ratings | 5 | 3 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Right offerings | 2 | 6 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Bank loan | 3 | 3 | 1 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| IPOs, IPO lockups, and quiet period | 2 | 2 | 3 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0.00 |

Source: El Ghoul, Sadok, Omrane Guedhami, Sattar A. Mansi, and Oumar Sy (2022). "Event studies in international finance research." Journal of International Business Studies : 1-21.

# Single- and Cross-county Event Studies

## published in the four major finance and IB journals

**Country-level events**

| Event/sample | Single-country sample | | | | | Cross-country sample | | | | | Cross country (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | JF | JFE | RFS | JIBS | Total | JF | JFE | RFS | JIBS | Total | |
| *Country-level events* | | | | | | | | | | | |
| Governance reform/legislative change | 8 | 15 | 6 | 0 | 29 | 2 | 1 | 0 | 0 | 3 | 9.38 |
| Elections/Political risk events | 0 | 8 | 5 | 0 | 13 | 1 | 0 | 1 | 2 | 4 | 23.53 |
| Monetary policy | 5 | 4 | 1 | 0 | 10 | 0 | 0 | 2 | 0 | 2 | 16.67 |
| Market trading mechanism changes | 3 | 6 | 1 | 0 | 10 | 1 | 0 | 0 | 0 | 1 | 9.09 |
| Government intervention | 2 | 0 | 1 | 0 | 3 | 3 | 0 | 1 | 0 | 4 | 57.14 |
| Macroeconomic and gov. announcement | 0 | 4 | 2 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| News | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 66.67 |
| Exchange rates and parity deviation | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 100.00 |
| Natural disasters | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Stock market liberalization | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 100.00 |
| Sovereign debt rating changes | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 100.00 |
| Tax enforcement | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 50.00 |

Source: El Ghoul, Sadok, Omrane Guedhami, Sattar A. Mansi, and Oumar Sy (2022). "Event studies in international finance research." Journal of International Business Studies : 1-21.

# Single- and Cross-county Event Studies

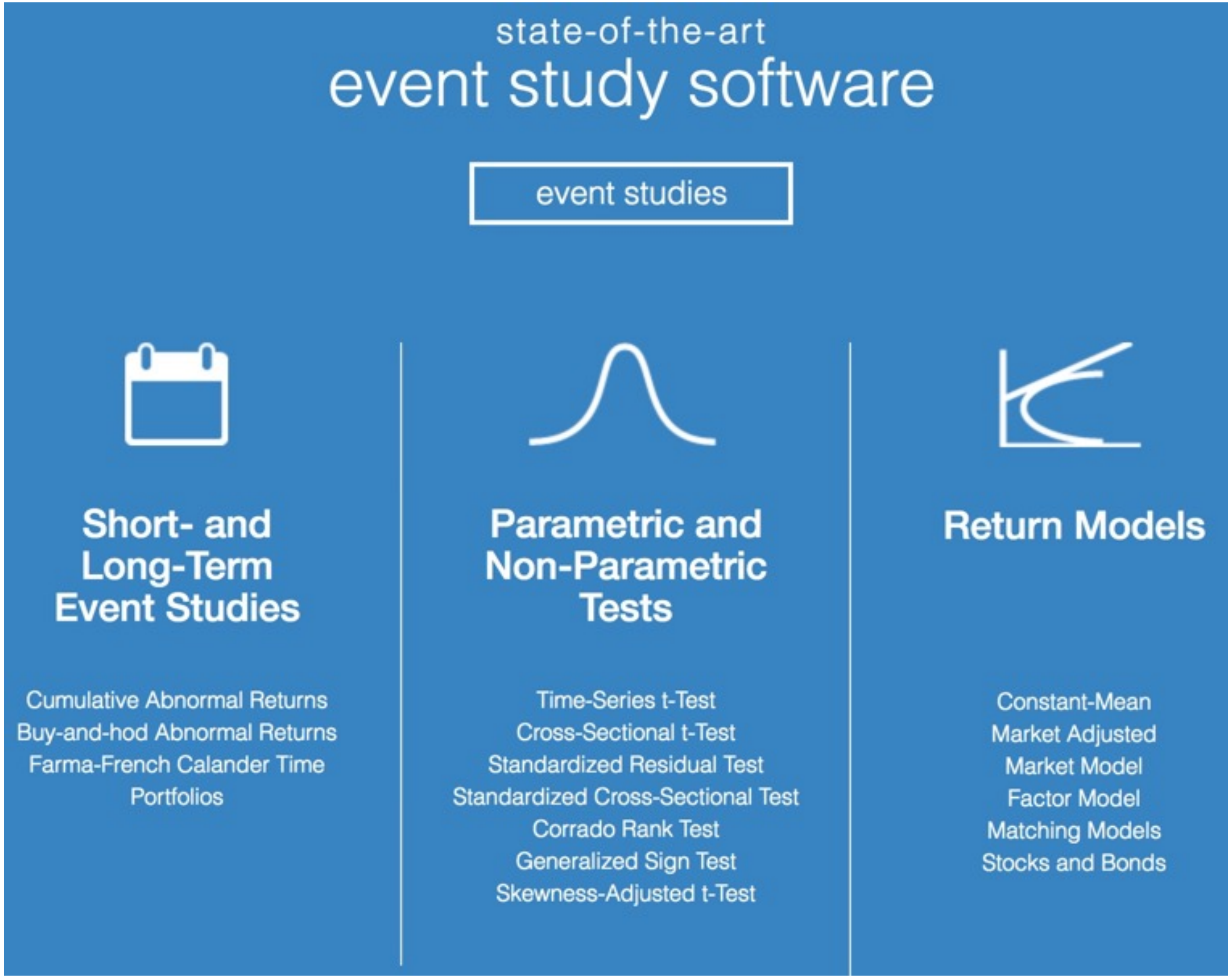
## published in the four major finance and IB journals

**Peer-level events**

| Event/sample | Single-country sample | | | | | Cross-country sample | | | | | Cross country (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | JF | JFE | RFS | JIBS | Total | JF | JFE | RFS | JIBS | Total | |
| *Peer-level events* | | | | | | | | | | | |
| Distress in bank–borrower relationship | 3 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Bankruptcy | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| M&As | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Security issuance | 2 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Regulatory enforcement | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Product market entry | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Earnings | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Proxy contests | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0.00 |
| Others | 0 | 14 | 3 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0.00 |

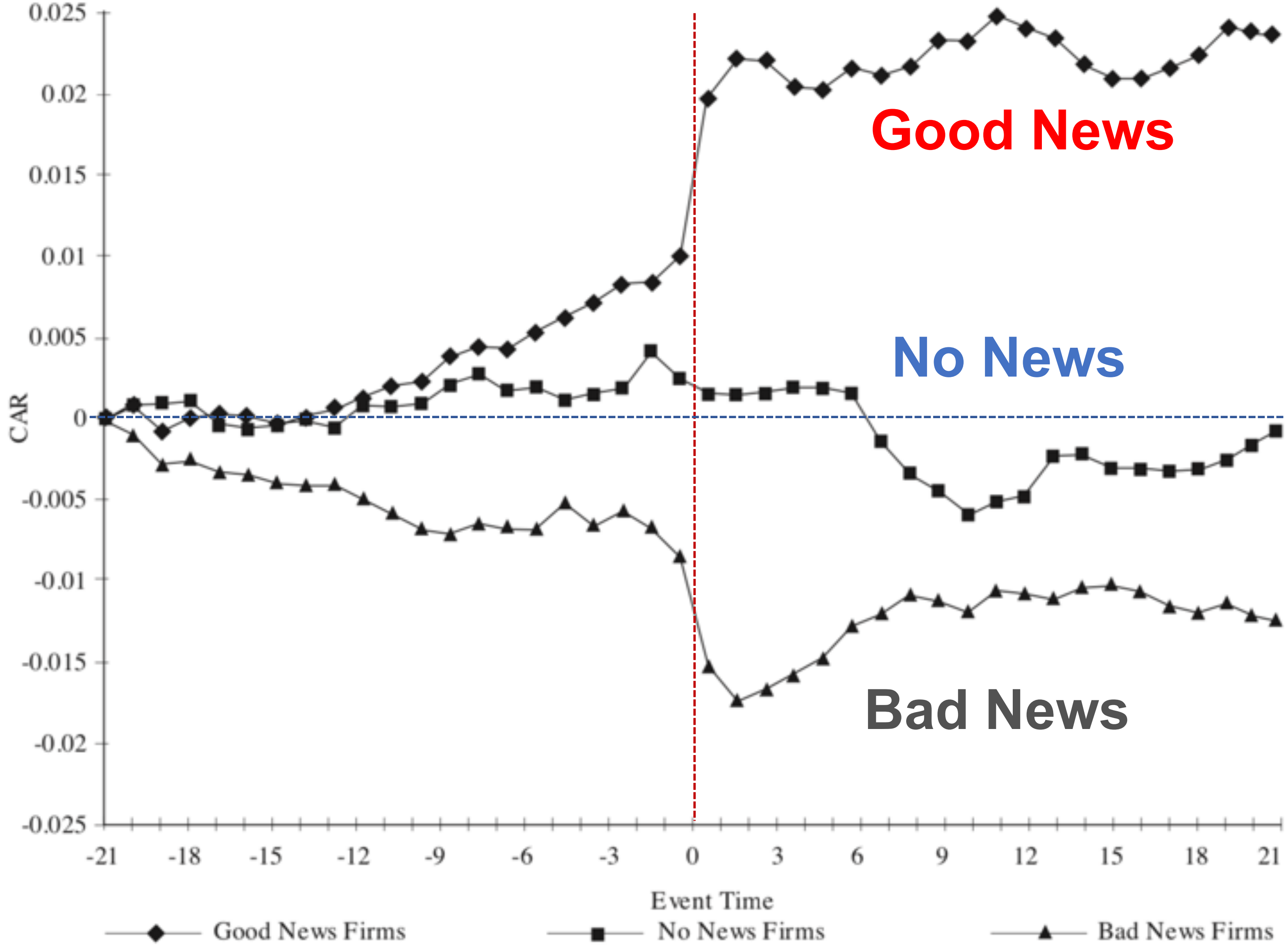
Source: El Ghoul, Sadok, Omrane Guedhami, Sattar A. Mansi, and Oumar Sy (2022). "Event studies in international finance research." Journal of International Business Studies : 1-21.

# Event Studies for Financial Research



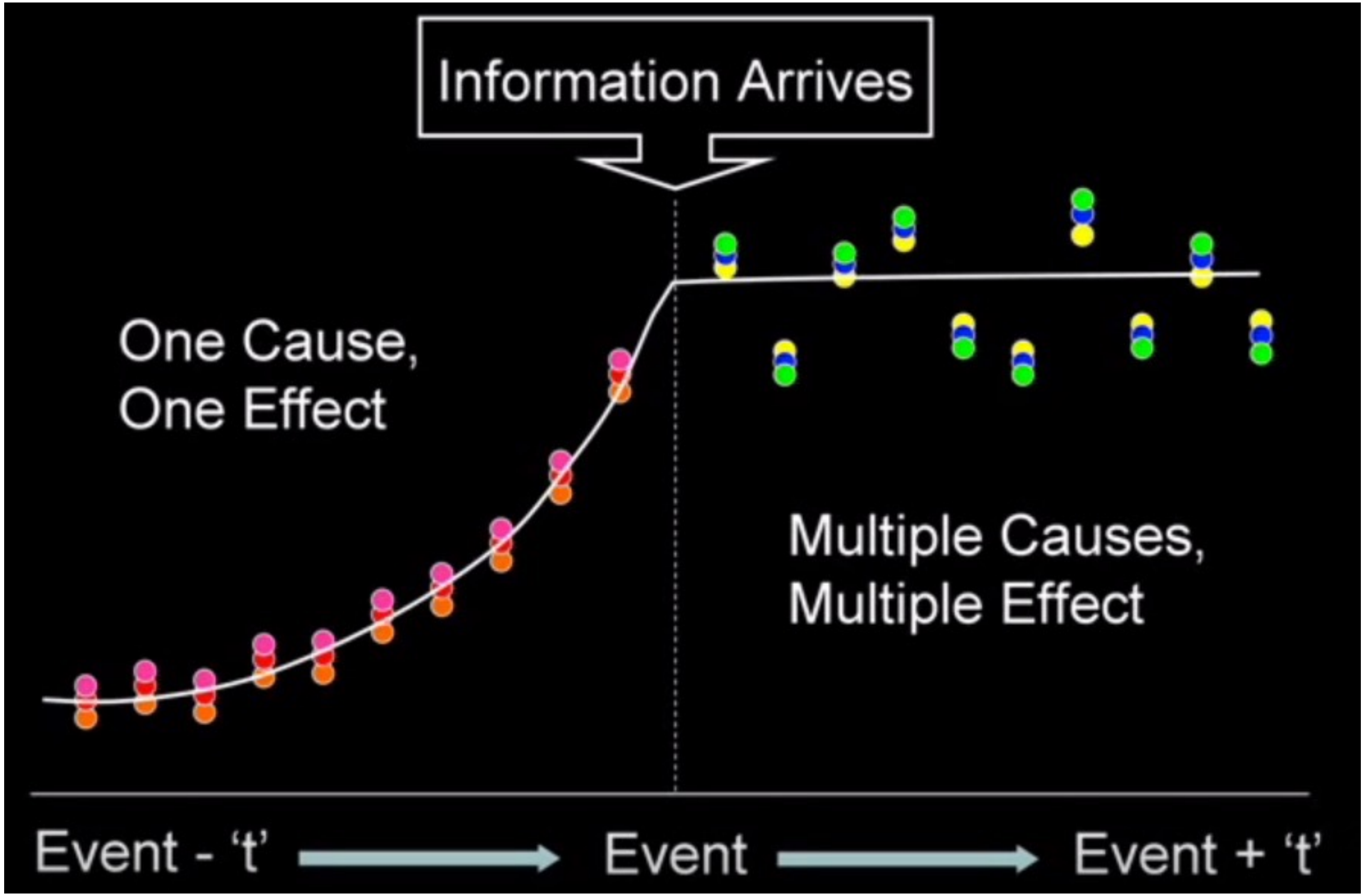

https://eventstudymetrics.com/

# Event Studies
# in Economics and Finance




Source: MacKinlay, A. C. (1997). Event studies in economics and finance. Journal of economic literature, 35(1), 13-39.

# Event Study

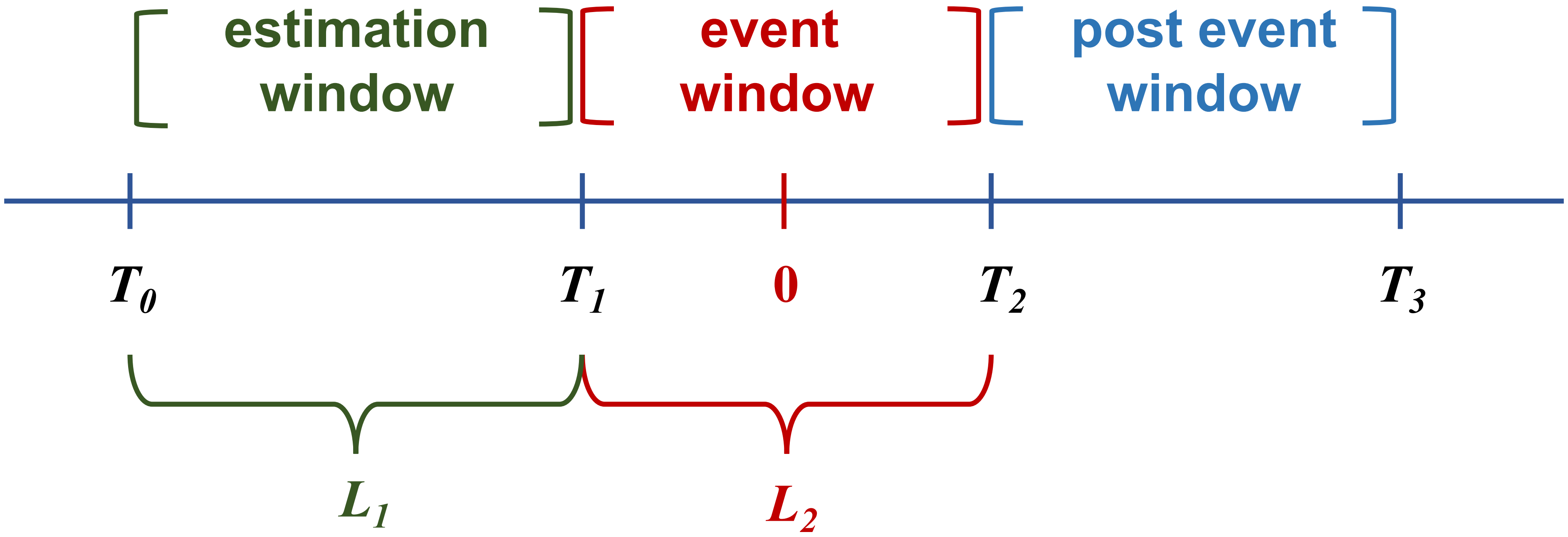



Source: Rajesh Mudholkar (2014), "Event studies: Confirms Market Efficiency or Behavioral Anomalies?", https://www.youtube.com/watch?v=VErwDaQNB74

# Event Study
# Time line for an event study

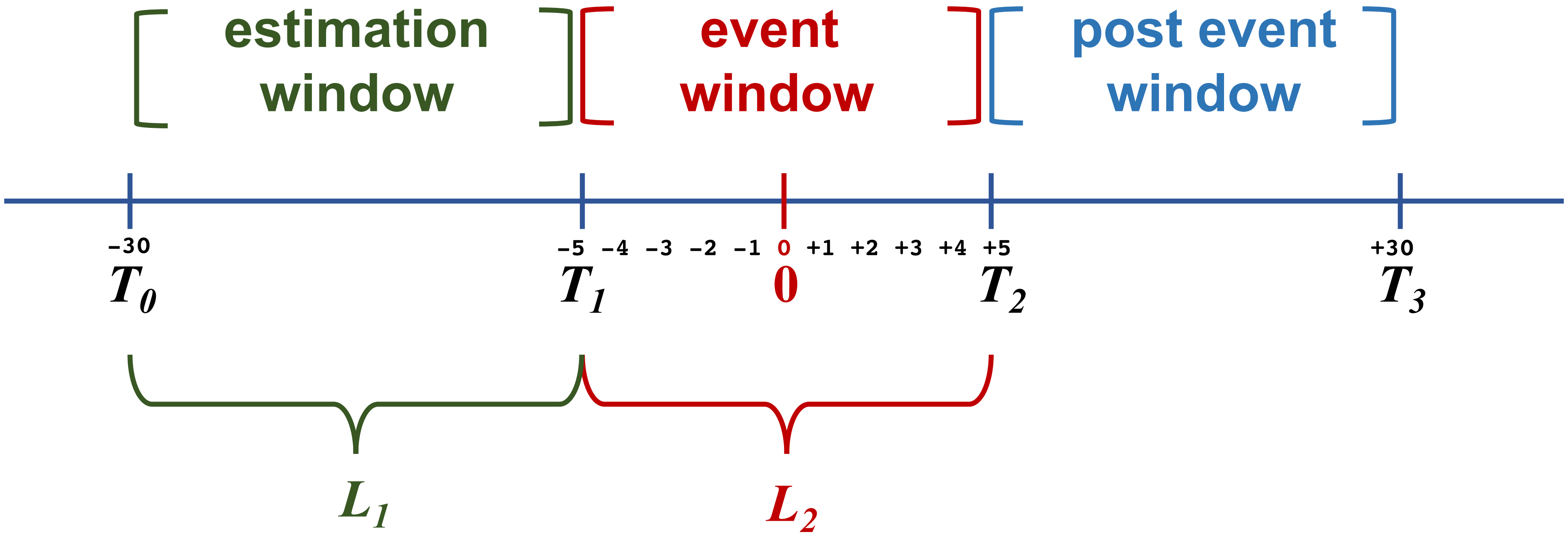

Source: https://eventstudymetrics.com/index.php/event-study-methodology/

# Event Study Methodology



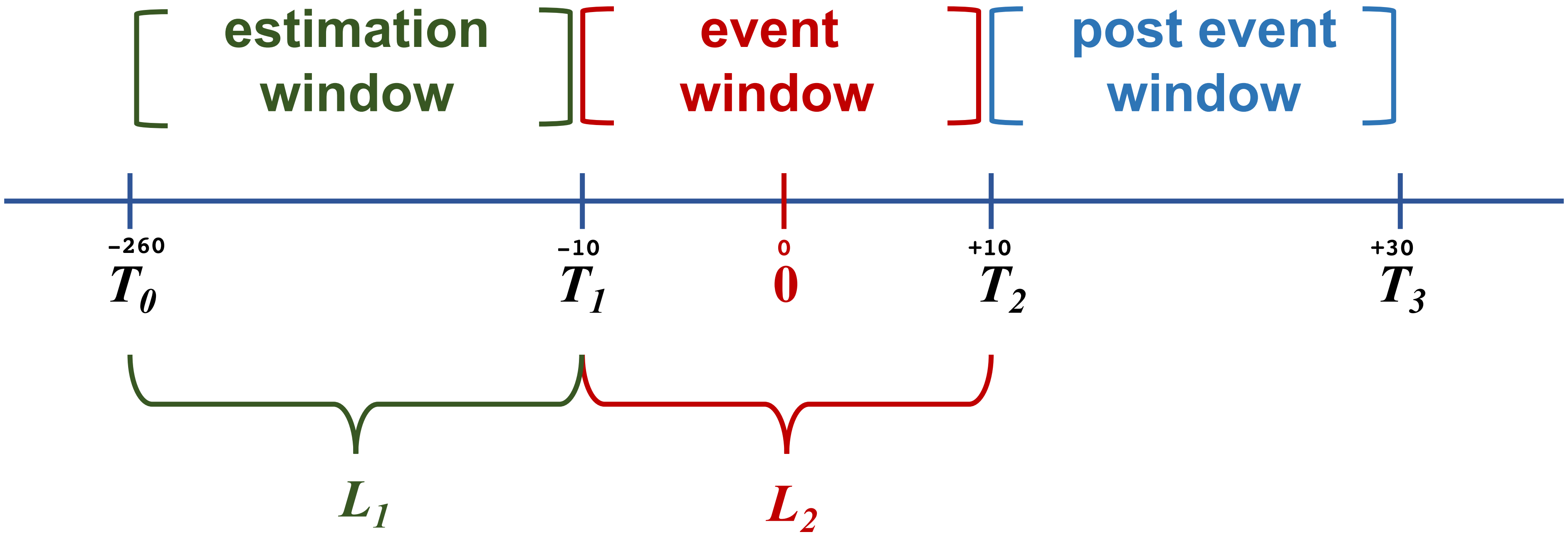

Source: https://eventstudymetrics.com/index.php/event-study-methodology/

# Event Study Methodology




Source: https://eventstudymetrics.com/index.php/event-study-methodology/

# Event Study Methodology




Source: https://eventstudymetrics.com/index.php/event-study-methodology/

# Efficient Markets

# Behavioral Economics

# Behavioral Finance

# Rational Behavior

# Irrational Behavior

# Emotion

# Sentiment

# Modern Financial Research

- Theoretical Finance
  - study of logical relationships among assets.
- Empirical Finance
  - study of data in order to infer relationships.
- Behavioral Finance
  - integrates psychology into the investment process.

Source: Robert A. Strong (2004), Practical Investment Management, South-Western

# Behavioral Finance Themes

- Heuristic-Driven Bias
- Framing Dependence
- Inefficient Markets

Source: Hersh Shefrin (2007), “Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing”, Oxford University Press.

# Efficient Market Hypothesis (EMH)

Source: Doron Kliger and Gregory Gurevich (2014), Event Studies for Financial Research: A Comprehensive Guide, Palgrave Macmillan

# Efficient Market Hypothesis (EMH) (Fama, 1970)

Efficient capital markets: A review of theory and empirical work

EF Fama - The Journal of Finance, 1970

This paper reviews the theoretical and empirical iterature on the efficient markets model. After a discussion of the theory, empirical work concerned with the adjustment of security prices to three relevant information subsets is considered. First, weak form tests, in which the information set is just historical prices, are discussed. Then semi-strong form tests, in which the concern is whether prices efficiently adjust to other information that is obviously ...



Malkiel, B. G., & Fama, E. F. (1970).
Efficient capital markets: A review of theory and empirical work.
The Journal of Finance, 25(2), 383-417.

# Efficient Market Hypothesis (EMH) (Fama, 1970)

SESSION TOPIC: STOCK MARKET PRICE BEHAVIOR

SESSION CHAIRMAN: BURTON G. MALKIEL

EFFICIENT CAPITAL MARKETS: A REVIEW OF THEORY AND EMPIRICAL WORK*

EUGENE F. FAMA**

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# Efficient Market Hypothesis (EMH) (Fama, 1970)

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## EFFICIENT CAPITAL MARKETS: A REVIEW OF THEORY AND EMPIRICAL WORK*

EUGENE F. FAMA**

### I. INTRODUCTION

THE PRIMARY ROLE of the capital market is allocation of ownership of the economy's capital stock. In general terms, the ideal is a market in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production-investment decisions, and investors can choose among the securities that represent ownership of firms' activities under the assumption that security prices at any time "fully reflect" all available information. A market in which prices always "fully reflect" available information is called "efficient."

This paper reviews the theoretical and empirical literature on the efficient markets model. After a discussion of the theory, empirical work concerned with the adjustment of security prices to three relevant information subsets is considered. First, *weak form* tests, in which the information set is just historical prices, are discussed. Then *semi-strong form* tests, in which the concern is whether prices efficiently adjust to other information that is obviously publicly available (e.g., announcements of annual earnings, stock splits, etc.) are considered. Finally, *strong form* tests concerned with whether given investors or groups have monopolistic access to any information relevant for price formation are reviewed.[1] We shall conclude that, with but a few exceptions, the efficient markets model stands up well.

Source: Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

TABLE 1 (from [10])
First-order Serial Correlation Coefficients for One-, Four-, Nine-, and Sixteen-Day Changes in $\text{Log}_e$ Price

| Stock | Differencing Interval (Days) One | Four | Nine | Sixteen |
|---|---|---|---|---|
| Allied Chemical | .017 | .029 | −.091 | −.118 |
| Alcoa | .118* | .095 | −.112 | −.044 |
| American Can | −.087* | −.124* | −.060 | .031 |
| A. T. & T. | −.039 | −.010 | −.009 | −.003 |
| American Tobacco | .111* | −.175* | .033 | .007 |
| Anaconda | .067* | −.068 | −.125 | .202 |
| Bethlehem Steel | .013 | −.122 | −.148 | .112 |
| Chrysler | .012 | .060 | −.026 | .040 |
| Du Pont | .013 | .069 | −.043 | −.055 |
| Eastman Kodak | .025 | −.006 | −.053 | −.023 |
| General Electric | .011 | .020 | −.004 | .000 |
| General Foods | .061* | −.005 | −.140 | −.098 |
| General Motors | −.004 | −.128* | .009 | −.028 |
| Goodyear | −.123* | .001 | −.037 | .033 |
| International Harvester | −.017 | −.068 | −.244* | .116 |
| International Nickel | .096* | .038 | .124 | .041 |
| International Paper | .046 | .060 | −.004 | −.010 |
| Johns Manville | .006 | −.068 | −.002 | .002 |
| Owens Illinois | −.021 | −.006 | .003 | −.022 |
| Procter & Gamble | .099* | −.006 | .098 | .076 |
| Sears | .097* | −.070 | −.113 | .041 |
| Standard Oil (Calif.) | .025 | −.143* | −.046 | .040 |
| Standard Oil (N.J.) | .008 | −.109 | −.082 | −.121 |
| Swift & Co. | −.004 | −.072 | .118 | −.197 |
| Texaco | .094* | −.053 | −.047 | −.178 |
| Union Carbide | .107* | .049 | −.101 | .124 |
| United Aircraft | .014 | −.190* | −.192* | −.040 |
| U.S. Steel | .040 | −.006 | −.056 | .236* |
| Westinghouse | −.027 | −.097 | −.137 | .067 |
| Woolworth | .028 | −.033 | −.112 | .040 |

* Coefficient is twice its computed standard error.

Source: Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

# Cumulative Average Residuals

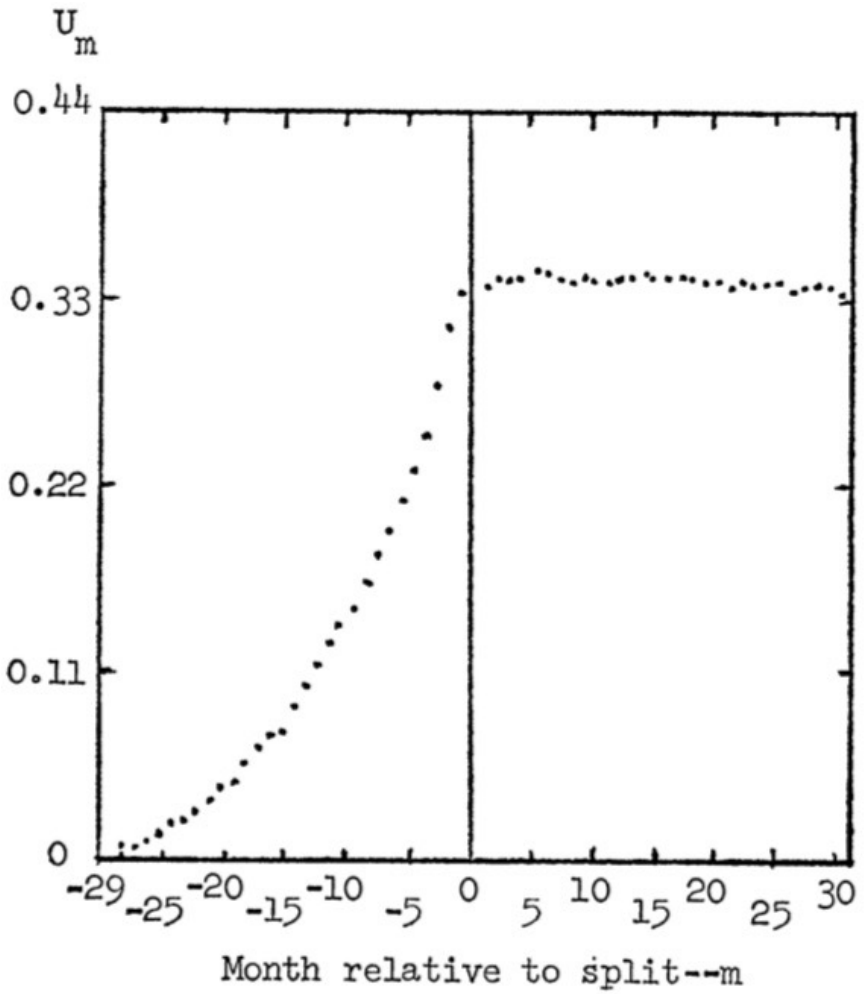



**Figure 1a**
Cumulative average residuals—all splits.

Source: Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

# Cumulative Average Residuals

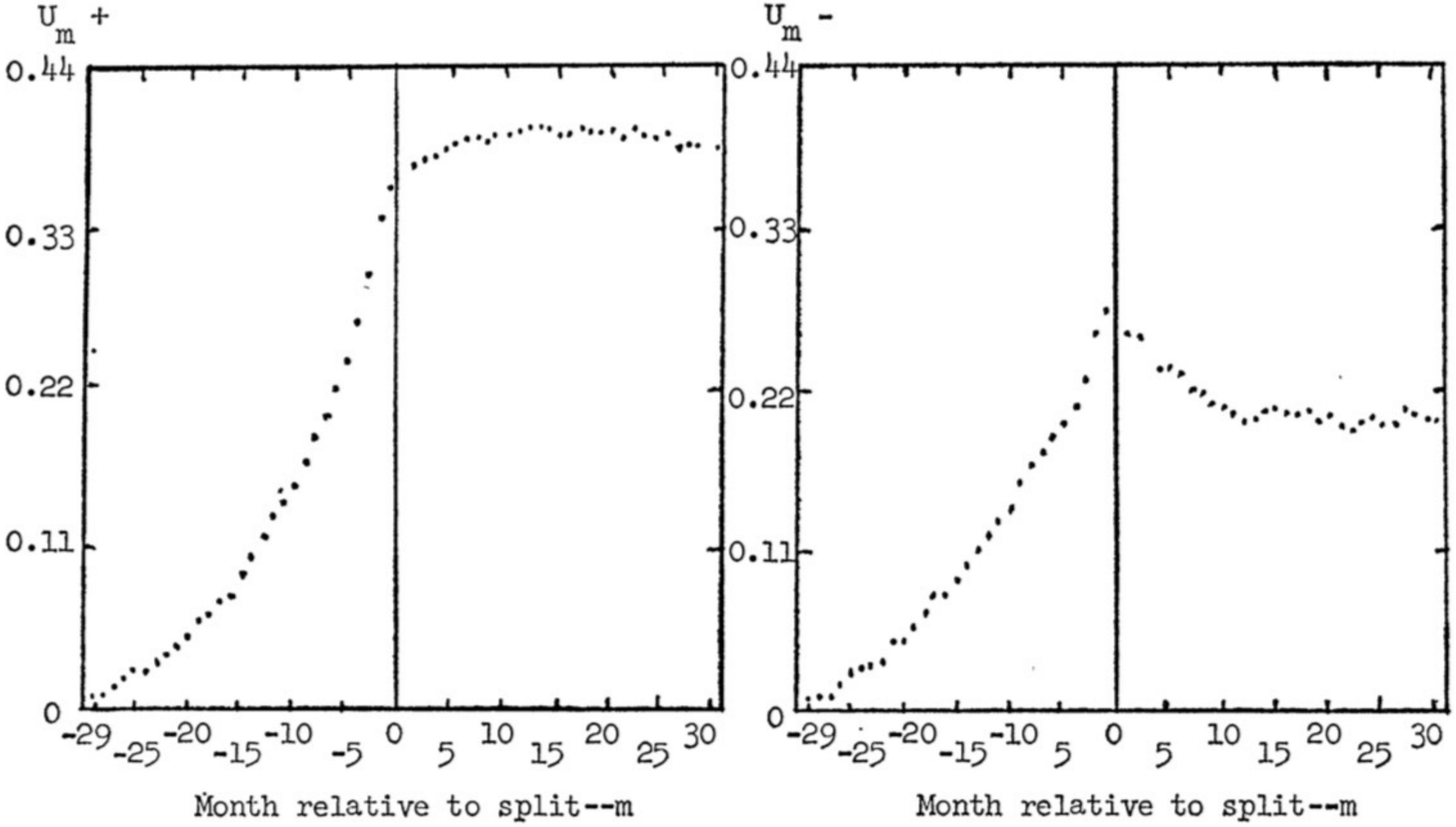



**FIGURE 1b**
Cumulative average residuals for dividend "increases."

**FIGURE 1c**
Cumulative average residuals for dividend "decreases."

Source: Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

# Market Efficiency

The empirical work itself can be divided into three categories depending on the nature of the information subset of interest. *Strong-form* tests are concerned with whether individual investors or groups have monopolistic access to any information relevant for price formation. One would not expect such an extreme model to be an exact description of the world, and it is probably best viewed as a benchmark against which the importance of deviations from market efficiency can be judged. In the less restrictive *semi-strong-form* tests the information subset of interest includes all obviously publicly available information, while in the *weak form* tests the information subset is just historical price or return sequences.

Source: Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

# Types of Efficiency Market

- Weak Form
  - Security prices reflect all information found in past prices and volume.
- Semi-Strong Form
  - Security prices reflect all publicly available information.
- Strong Form
  - Security prices reflect all information—public and private.

# Can Financing Decisions Create Value?

# What Sort of Financing Decisions?

- **Typical financing decisions include:**
  - **How much debt and equity to sell**
  - **When (or if) to pay dividends**
  - **When to sell debt and equity**
- **Just as we can use NPV criteria to evaluate investment decisions, we can use NPV to evaluate financing decisions.**

# How to Create Value through Financing

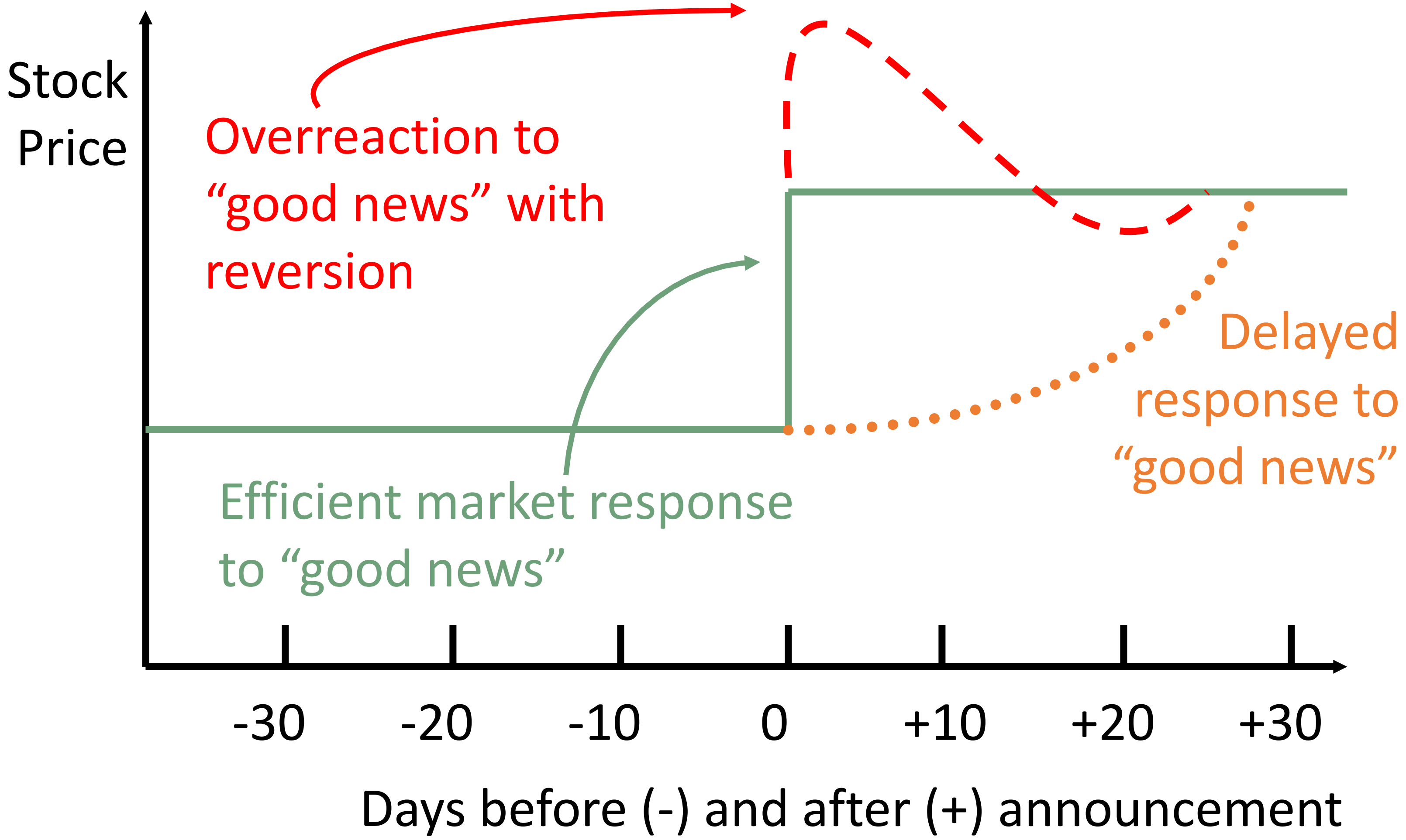
- Fool Investors
  - Empirical evidence suggests that it is hard to fool investors consistently.
- Reduce Costs or Increase Subsidies
  - Certain forms of financing have tax advantages or carry other subsidies.
- Create a New Security
  - Sometimes a firm can find a previously-unsatisfied clientele and issue new securities at favorable prices.
  - In the long-run, this value creation is relatively small, however.

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

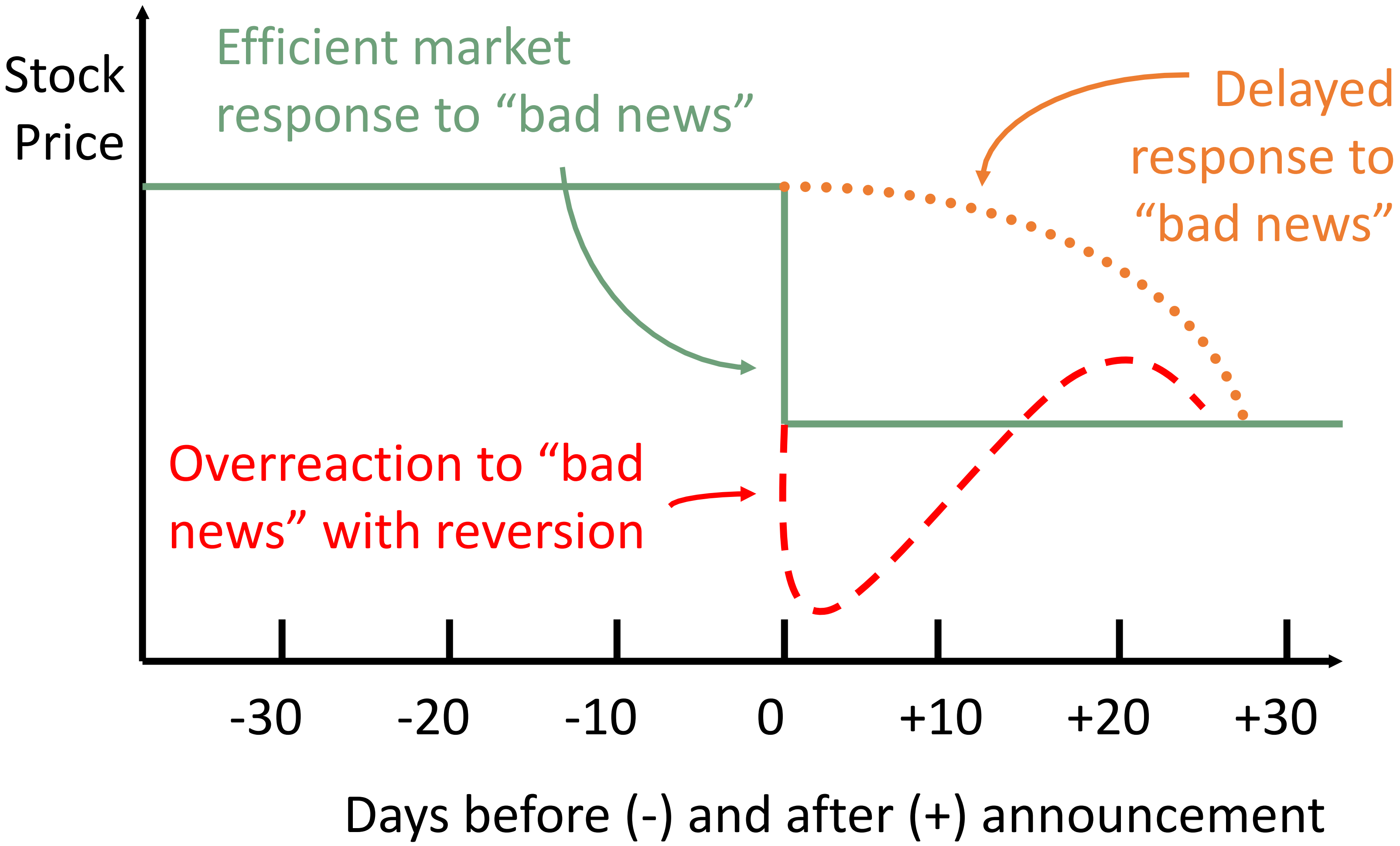
# Efficient Capital Markets

- **An efficient capital market is one in which stock prices fully reflect available information.**
- **The EMH has implications for investors and firms.**
    - **Since information is reflected in security prices quickly, knowing information when it is released does an investor no good.**
    - **Firms should expect to receive the fair value for securities that they sell. Firms cannot profit from fooling investors in an efficient market.**

# Reaction of Stock Price to New Information in Efficient and Inefficient Markets



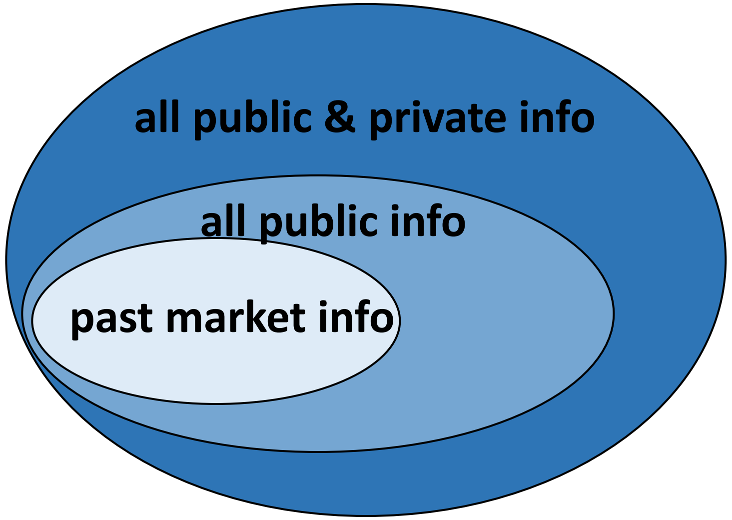
# Reaction of Stock Price to New Information in Efficient and Inefficient Markets



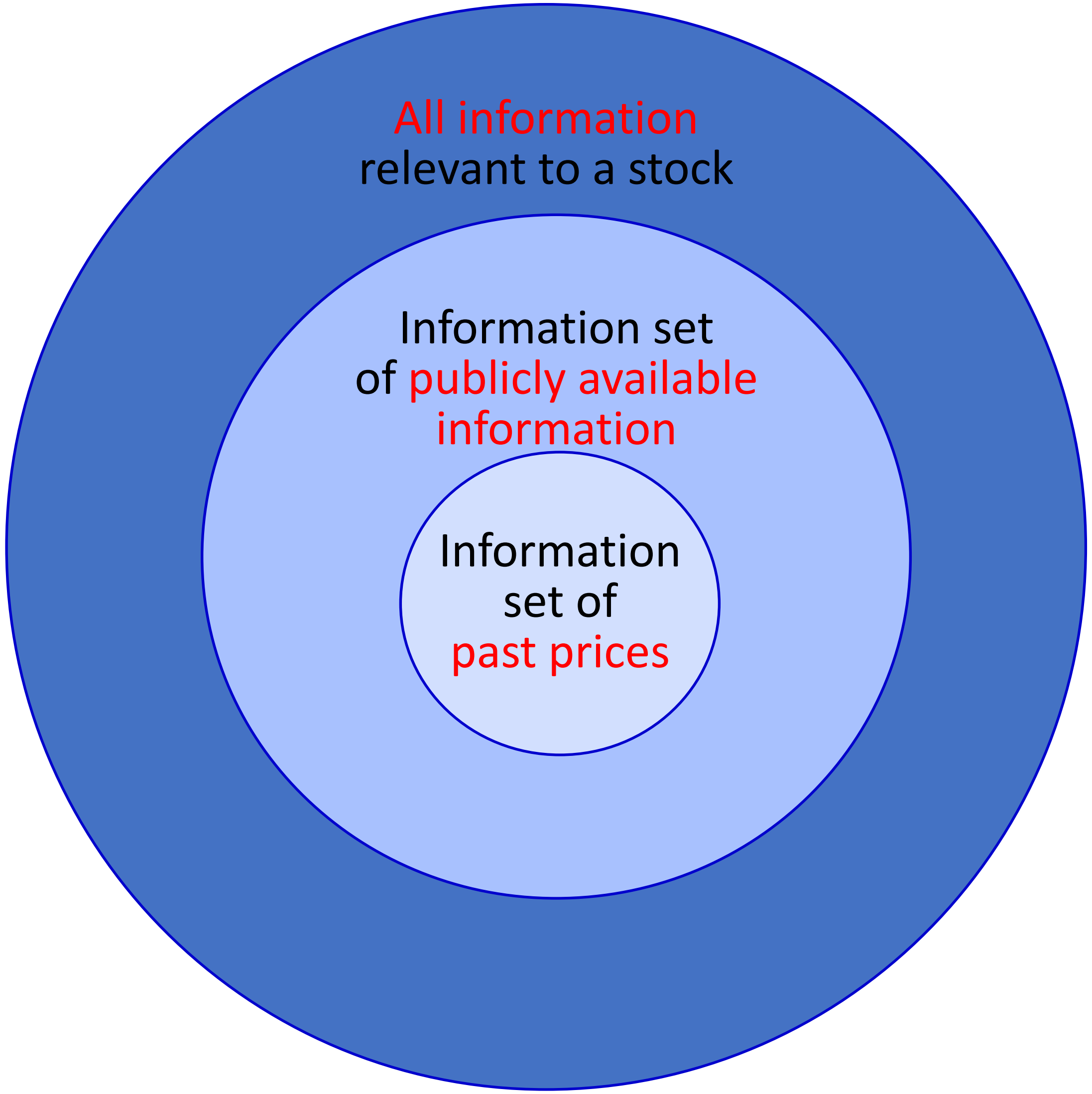

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Versions of EMH/Info-Efficiency

- **Weak-form** efficiency:
  - Prices reflect all information contained in past prices
- **Semi-strong-form** efficiency:
  - Prices reflect all publicly available information
- **Strong-form** efficiency:
  - Prices reflect all relevant information, include private (insider) information



# Relationship among Three Different Information Sets




Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Efficient Market

- **An efficient market incorporates information in security prices.**
- **There are three forms of the EMH:**
  - **Weak-Form EMH**

    Security prices reflect past price data.
  - **Semistrong-Form EMH**

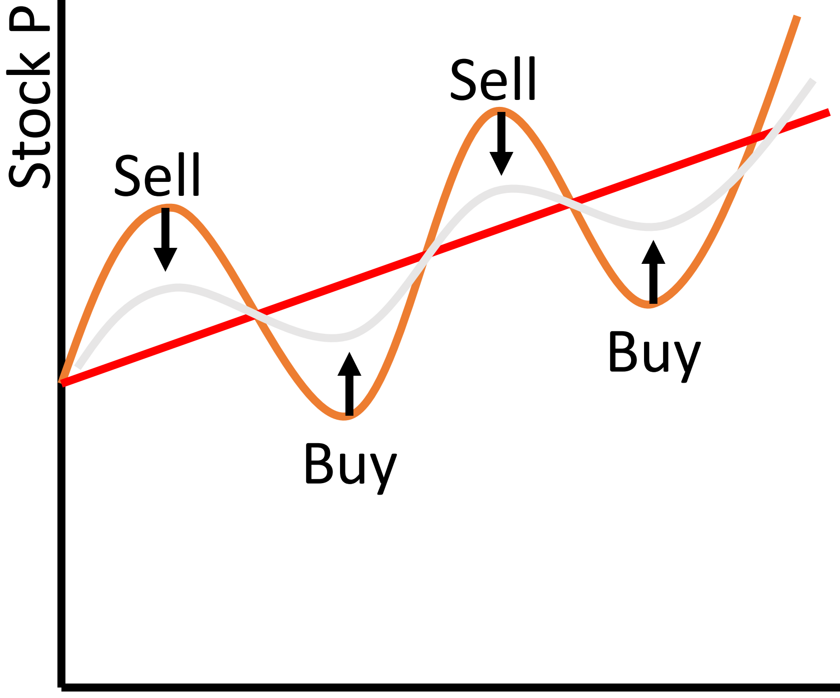
    Security prices reflect publicly available information.
  - **Strong-Form EMH**

    Security prices reflect all information.
- **There is abundant evidence for the first two forms of the EMH.**

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Why Technical Analysis Fails

Investor behavior tends to eliminate any profit opportunity associated with stock price patterns.




If it were possible to make big money simply by finding “the pattern” in the stock price movements, everyone would do it and the profits would be competed away.

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Evidence on Market Efficiency

- Return Predictability Studies
- Event Studies
- Performance Studies

# Event Studies

- Objective
  - Examine if new (company specific) information is incorporated into the stock price in one single price jump upon public release?

# Event Studies Methodology

1. Define as day "zero" the day the information is released
2. Calculate the daily returns $R_{it}$ the 30 days around day "zero":
   t = -30, -29,…-1, 0, 1,…, 29, 30
3. Calculate the daily returns $R_{mt}$ for the same days on the market (or a comparison group of firms of similar industry and risk)
4. Define Abnormal Returns (AR) as the difference $AR_{it} = R_{it} - R_{mt}$
5. Calculate Average Abnormal Returns (AAR) over all N events in the sample for all 60 reference days $AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$
6. Cumulate the returns on the first T days to CAAR $CAAR_T = \sum_{t=-30}^{T} AAR_t$

# Event Studies Methodology

**Step 1.**

**Define as day “zero” the day the information is released**

# Event Studies Methodology

**Step 2.**

**Calculate the daily returns $R_{it}$ the 30 days around day "zero":**

**t = -30, -29,…-1, 0, 1,…, 29, 30**

Source: Markus K. Brunnermeier (2015), "Lecture 10: Market Efficiency", Finance 501: Asset Pricing, Princeton University

# Event Studies Methodology

**Step 3.**

**Calculate the daily returns**
**$R_{mt}$ for the same days on the market**
**(or a comparison group of firms of similar industry and risk)**

# Event Studies Methodology

**Step 4.**

**Define**

**Abnormal Returns (AR)**

**as the difference**

$$AR_{it} = R_{it} - R_{mt}$$

# Event Studies Methodology

**Step 5.**

**Calculate**

**Average Abnormal Returns (AAR)**

**over all N events in the sample for all 60 reference days**

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

# Event Studies Methodology

**Step 6.**

**Cumulate the returns on the first T days to**

**Cumulative Average Abnormal Returns (CAAR)**

$$CAAR_T = \sum_{t=-30}^{T} AAR_t$$

# Event Studies Methodology

1. **Define as day "zero" the day the information is released**
2. **Calculate the daily returns $R_{it}$ the 30 days around day "zero": t = -30, -29,…-1, 0, 1,…, 29, 30**
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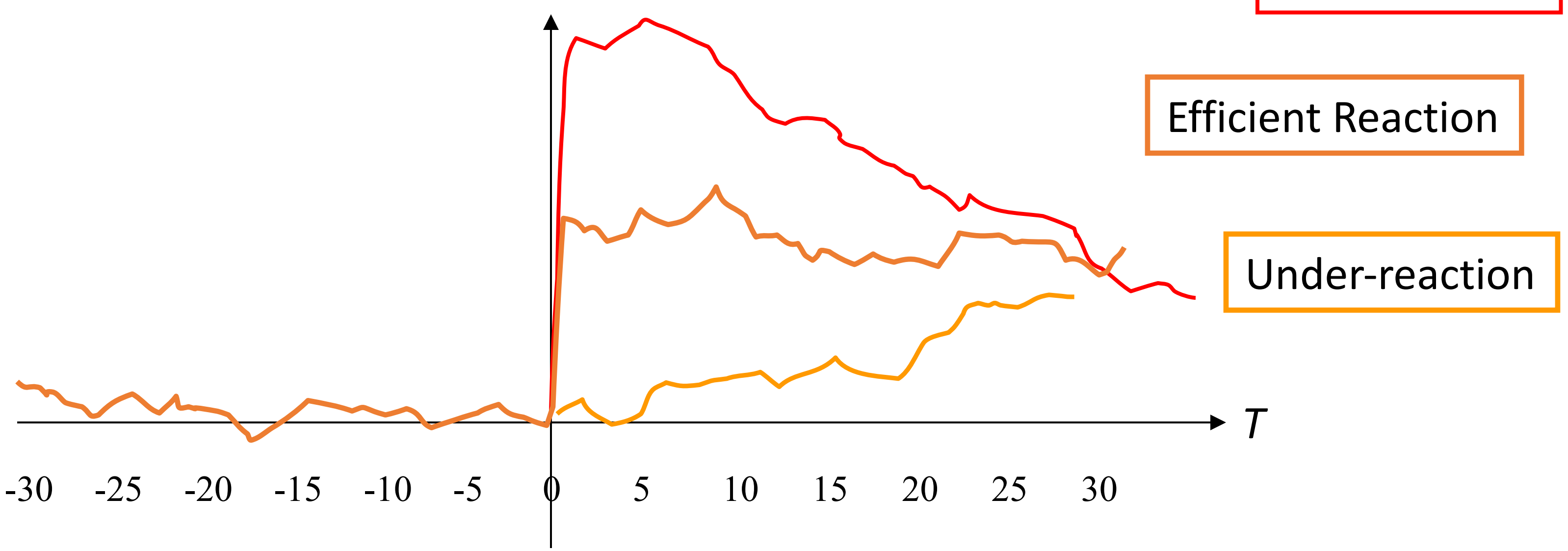
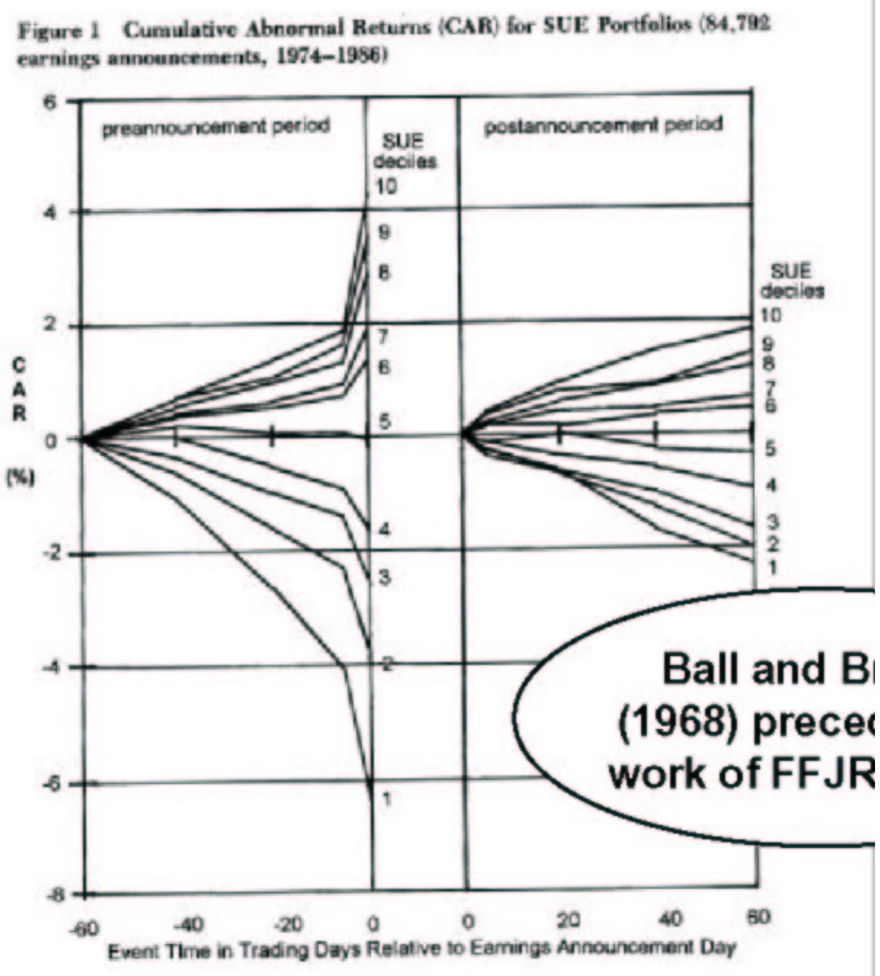
6. **Cumulate the returns on the first T days to CAAR** $$CAAR_T = \sum_{t=-30}^{T} AAR_t$$

# Market Efficiency in Event Studies

$$CAAR_T = \sum_{t=-30}^{T} AAR_t$$



# Event Study: Earning Announcements




Event Study by
Ball and Brown (1968)
Pre-announcement drift prior to earnings due to insider trading

! against strong-form

Post-announcement drift

! against semi-strong form

# Event Study:
# Earning Announcement

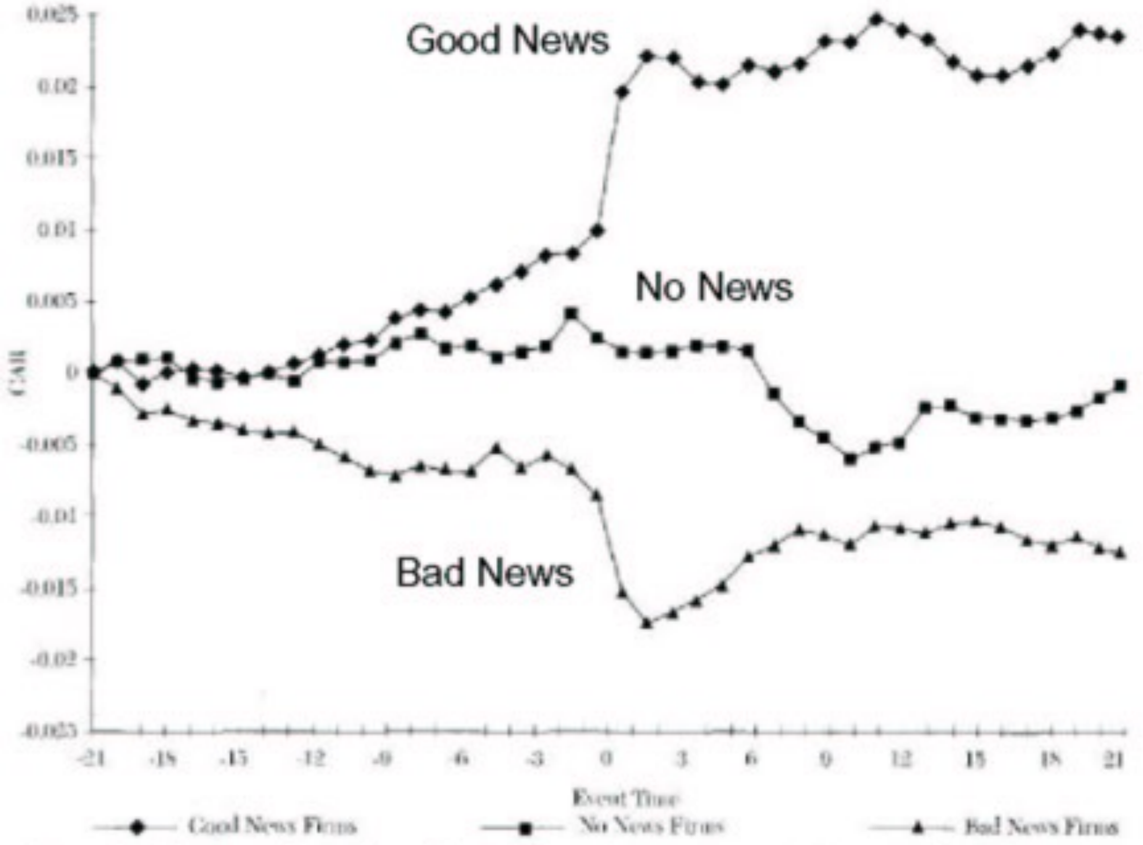
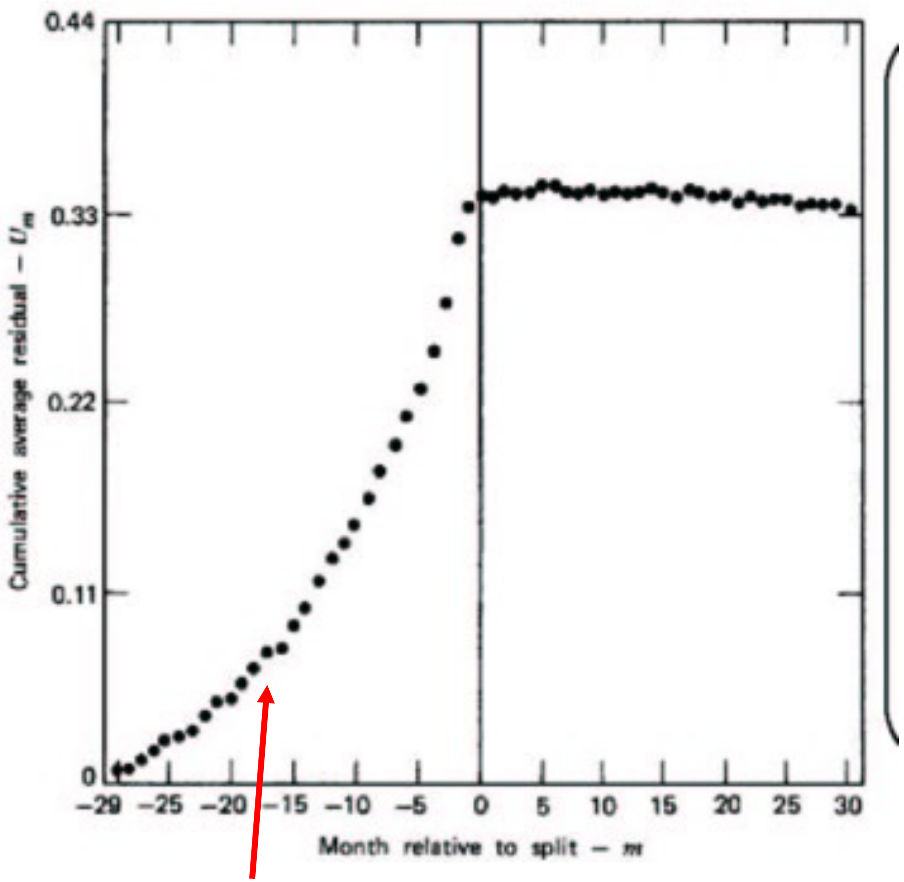



*Figure 2a.* Plot of cumulative abnormal return for earning announcements from event day -20 to event day 20. The abnormal return is calculated using the market model as the normal return measure.

Cumulative abnormal returns around earning announcements

(MacKinlay 1997)

# Event Study: Stock Splits




Selection bias or
Insider trading

Event Study on Stock Splits by Fama-French-Fischer-Jensen-Roll (1969)

Split is a signal of good profit

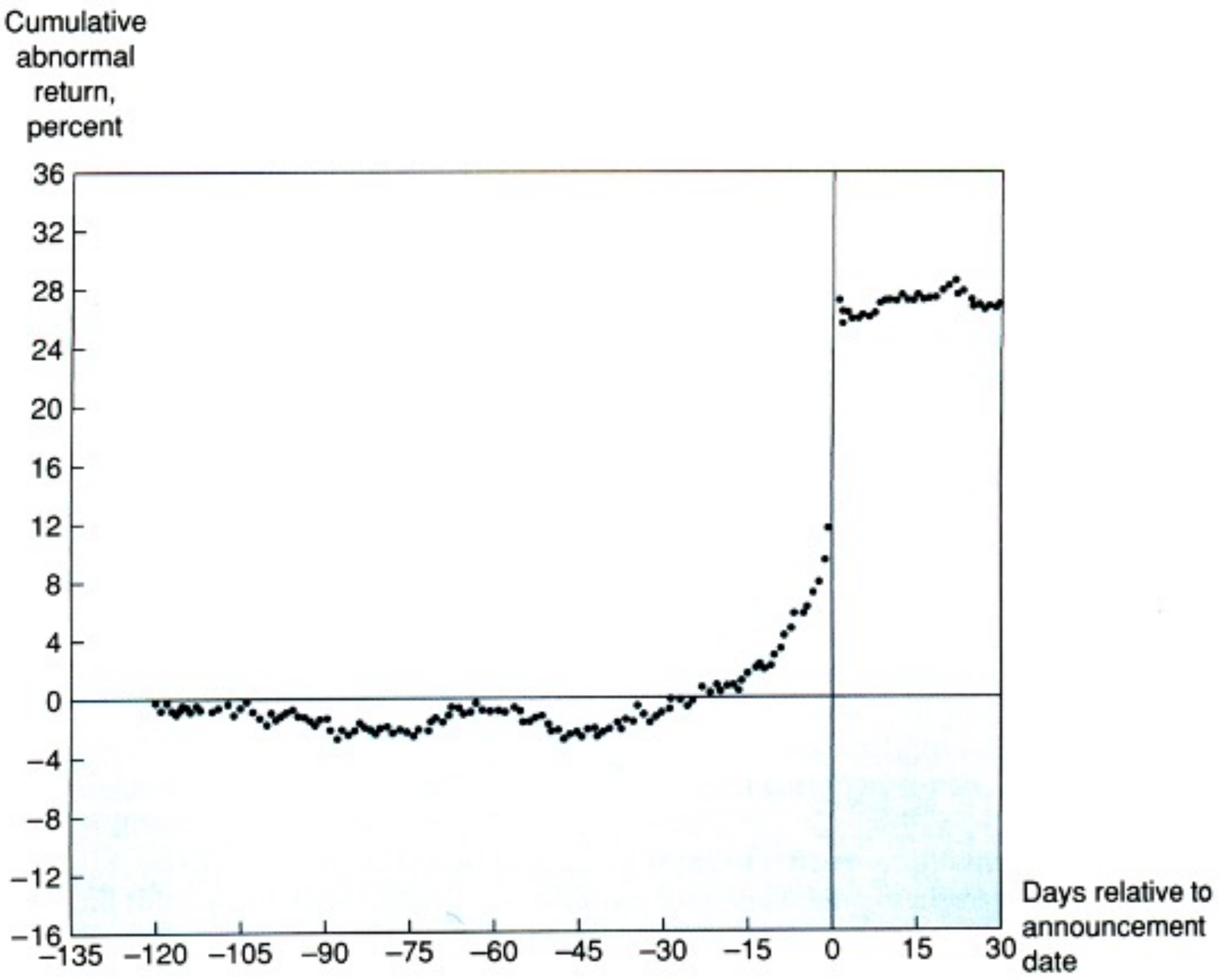
Pre-announcement drift can be due to selection bias (only good firms split) or insider trading.

! inconclusive

No post-announcement drift

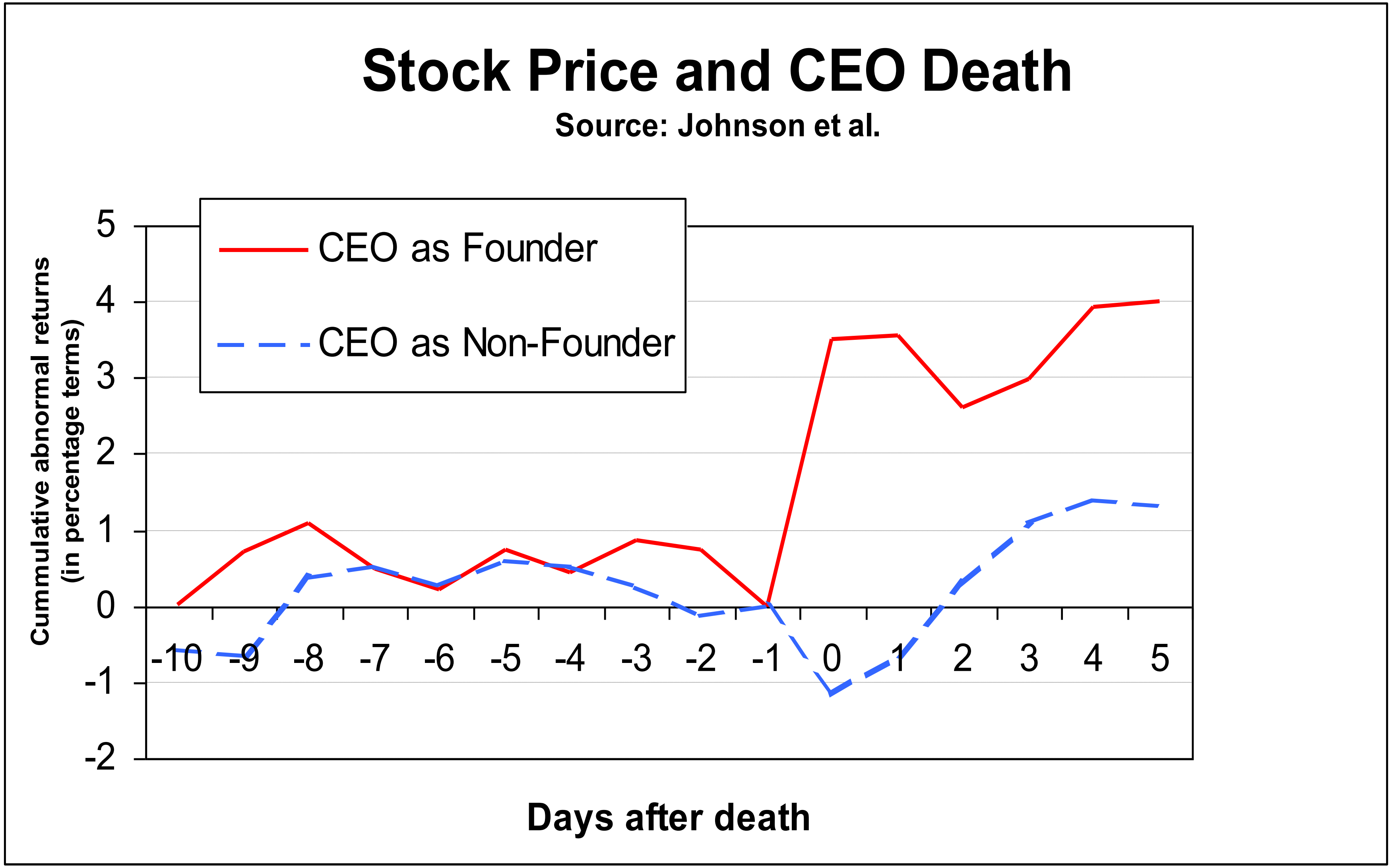
! for weak form

# Event Study: Take-over




Source: Markus K. Brunnermeier (2015), “Lecture 10: Market Efficiency”, Finance 501: Asset Pricing, Princeton University

# Event Study: Death of CEO



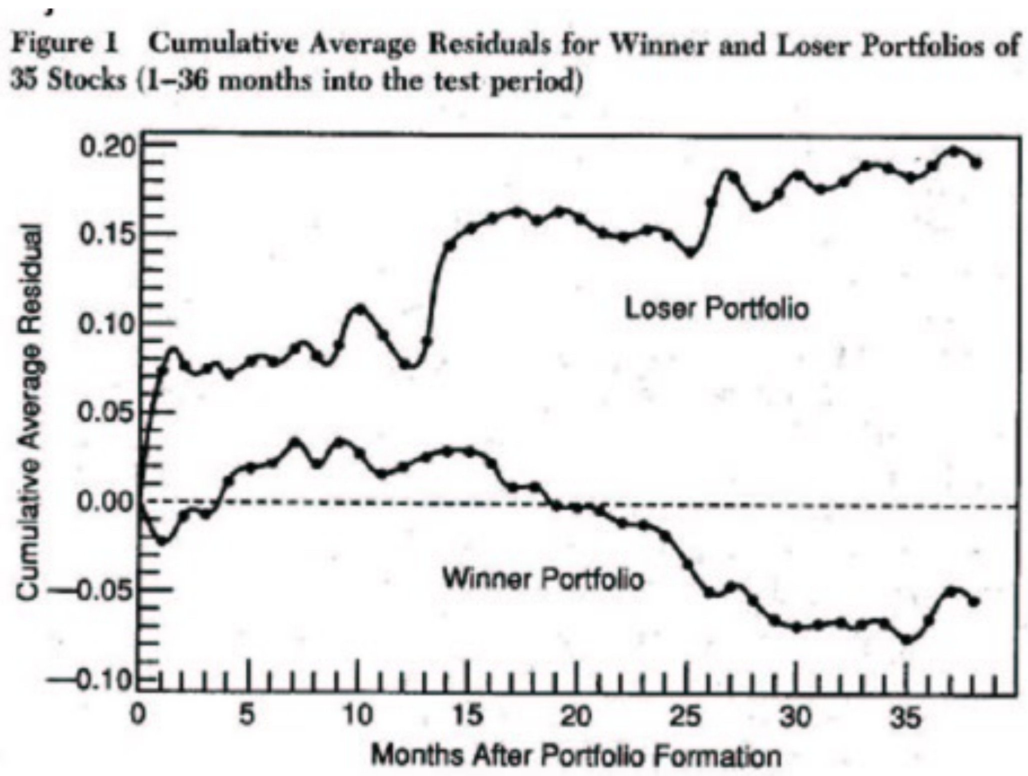

Source: Markus K. Brunnermeier (2015), “Lecture 10: Market Efficiency”, Finance 501: Asset Pricing, Princeton University

# Evidence I: Predictabilities Studies

- Statistical variables have only low forecasting power, but
  - But some forecasting power for P/E or B/M
  - Short-run momentum and long-run reversals
- Calendar specific abnormal returns due to Monay effect, January effect etc.
- CAVEAT: Data mining: Find variables with spurious forecasting power if we search enough

Source: Markus K. Brunnermeier (2015), “Lecture 10: Market Efficiency”, Finance 501: Asset Pricing, Princeton University

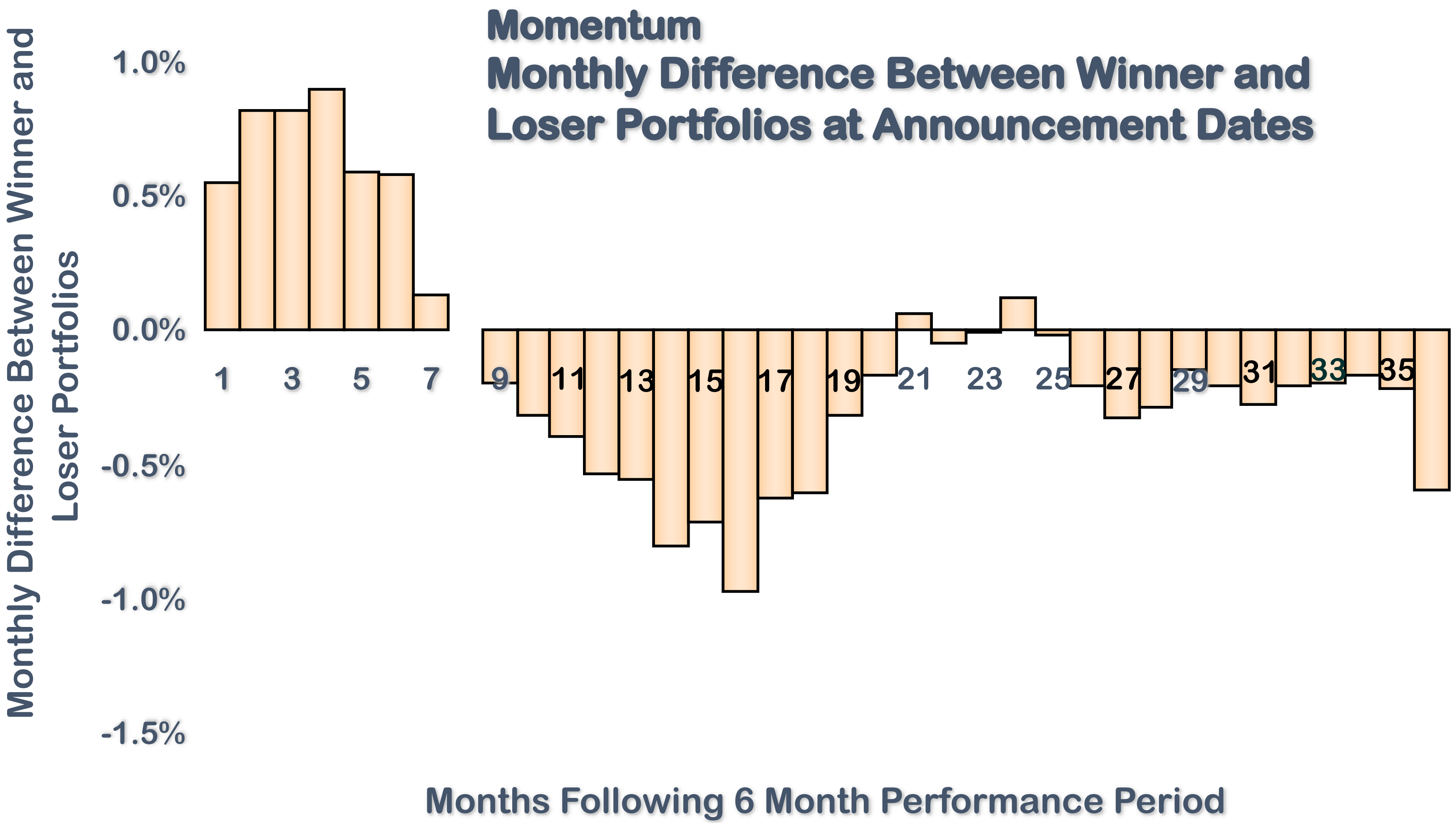
# Long-Run Reversals




**Long-run Reversals**

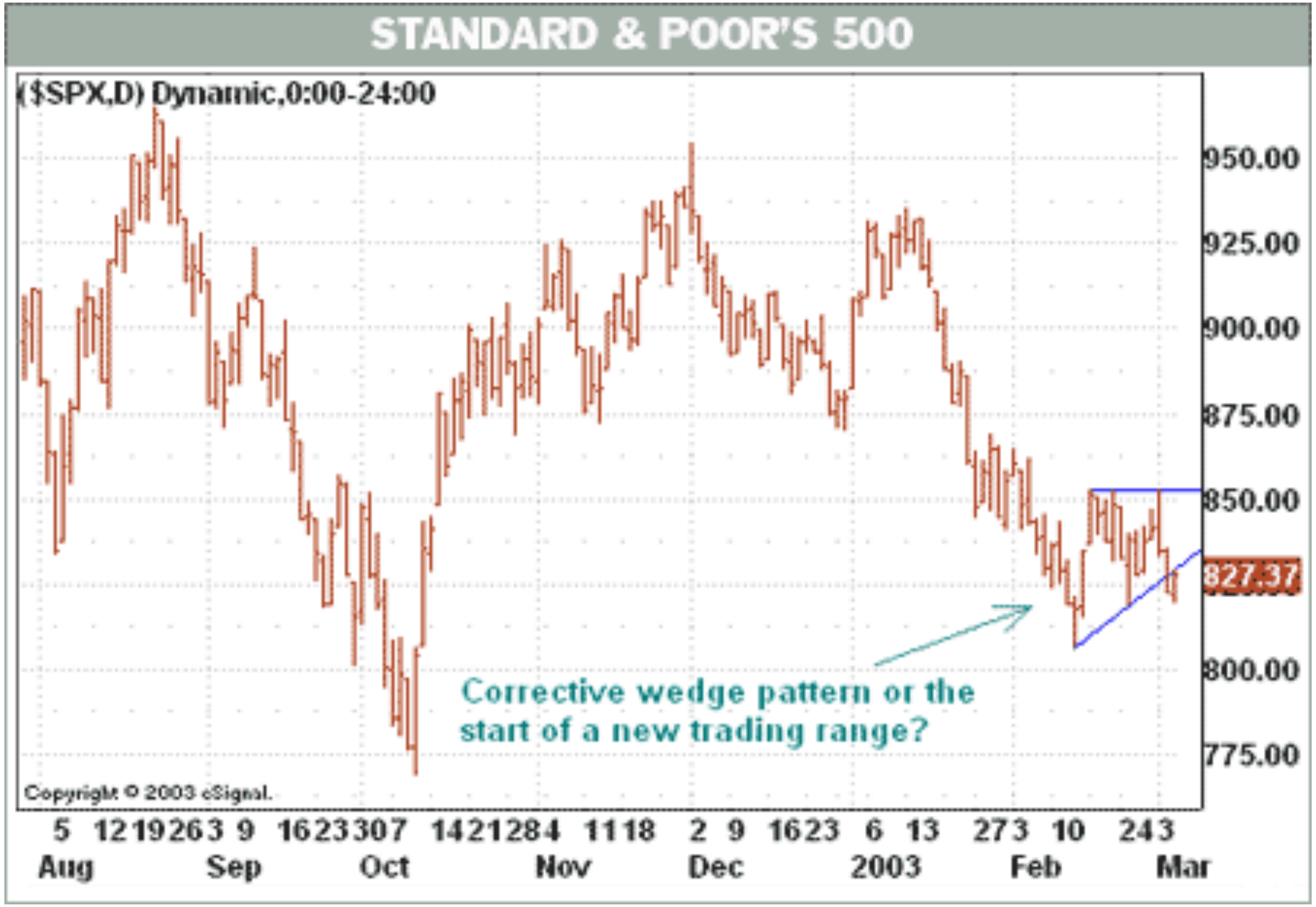
**Returns to previous 5 year's winner-loser stocks (market adjusted returns)**

# Short-run Momentum




Source: Markus K. Brunnermeier (2015), “Lecture 10: Market Efficiency”, Finance 501: Asset Pricing, Princeton University

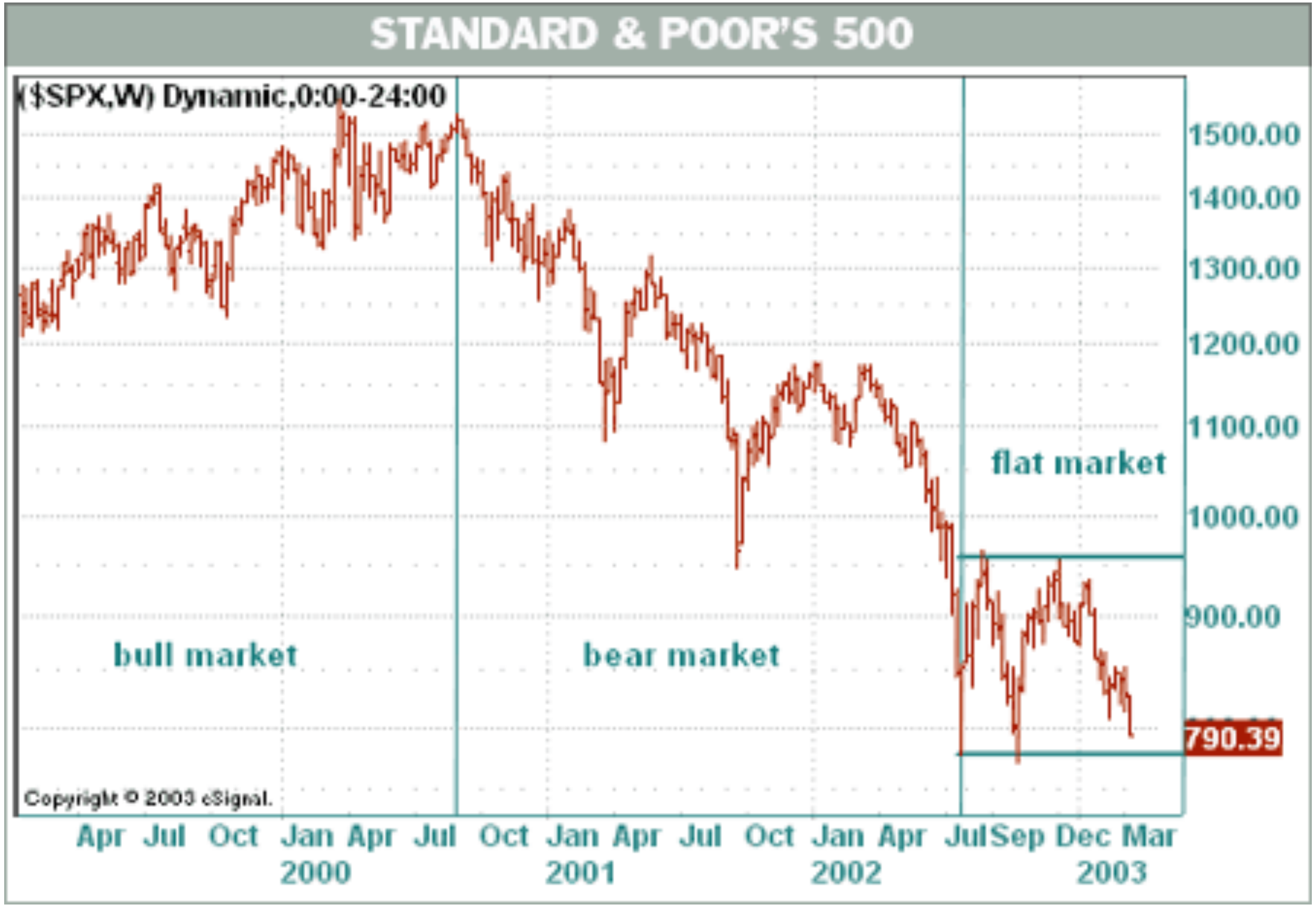
# Getting Technical
# Barron's March 5, 2003




Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

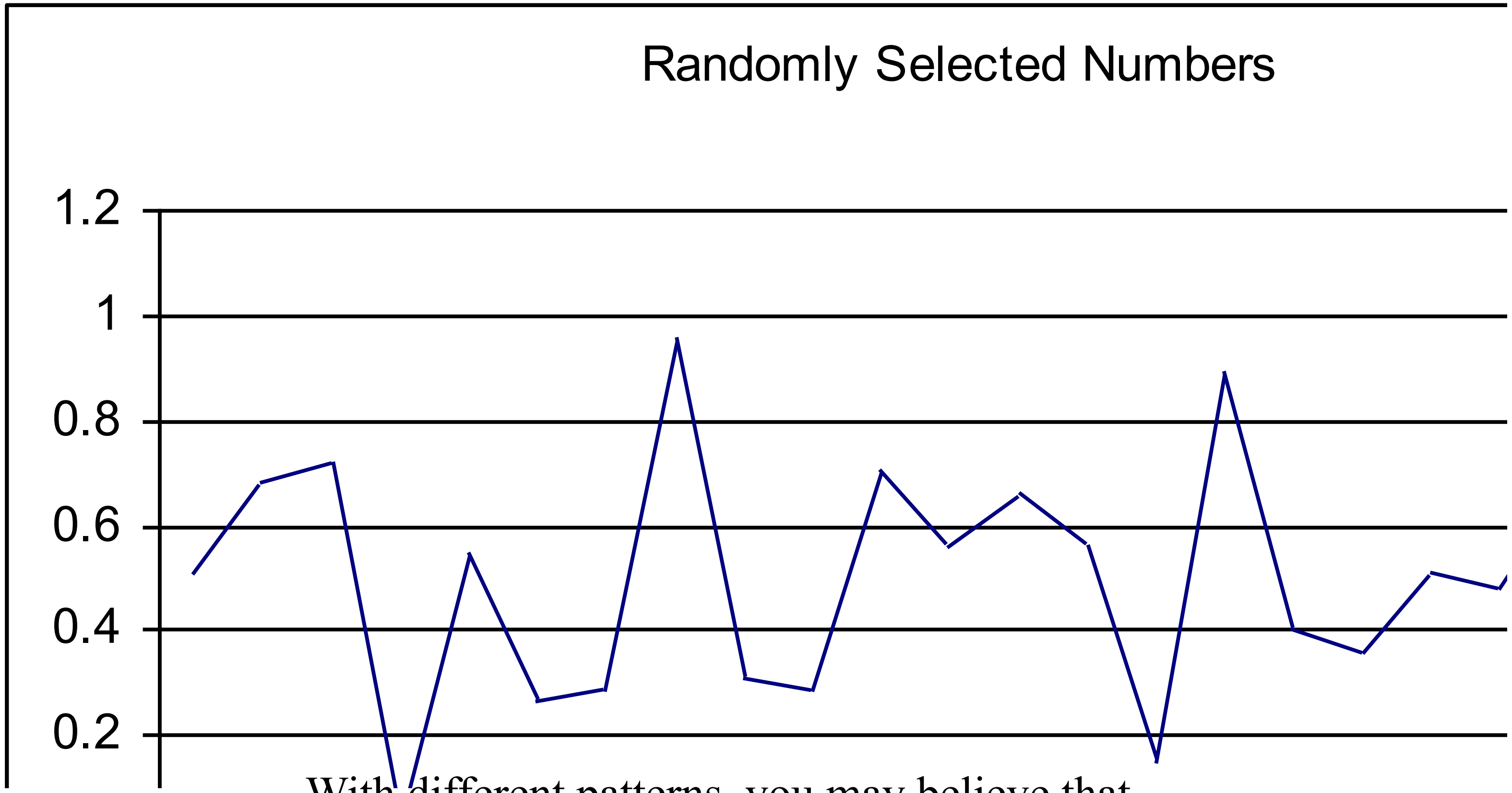
# Getting Technical

## Back to Buy Low, Sell High *Barron's March 12, 2003*




Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

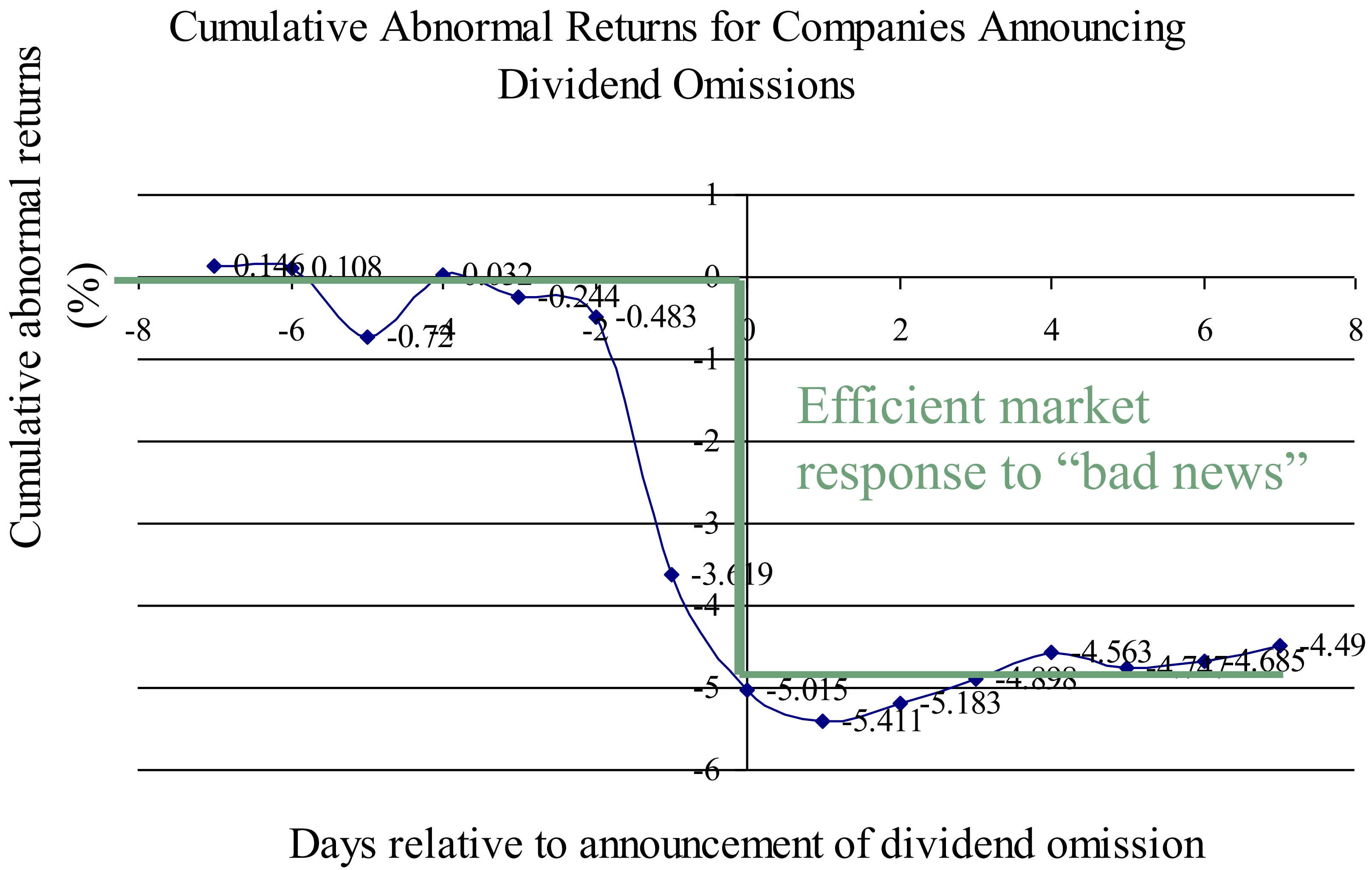
# What Pattern Do You See?




With different patterns, you may believe that you can predict the next value in the series—even though you *know* it is random.

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Event Studies: Dividend Omissions

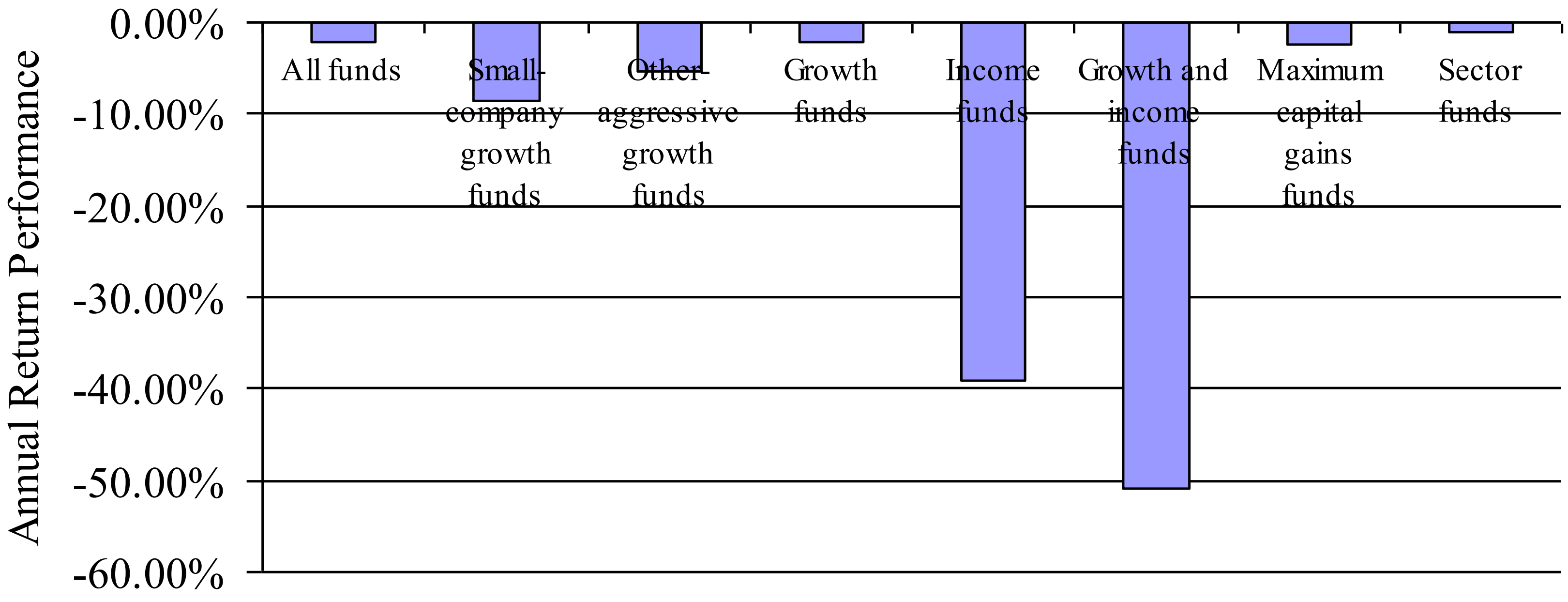



S.H. Szewczyk, G.P. Tsetsekos, and Z. Santout “Do Dividend Omissions Signal Future Earnings or Past Earnings?” *Journal of Investing* (Spring 1997)

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# The Record of Mutual Funds

Annual Return Performance of Different Types of U.S. Mutual Funds Relative to a Broad-Based Market Index (1963-1998)




Taken from Lubos Pastor and Robert F. Stambaugh, "Evaluating and Investing in Equity Mutual Funds," unpublished paper, Graduate School of Business, University of Chicago (March 2000).

# Weak Form Market Efficiency

- Security prices reflect all information found in past prices and volume.
- If the weak form of market efficiency holds, then technical analysis is of no value.
- Often weak-form efficiency is represented as
- $P_t = P_{t-1}$ + Expected return + random error t
- Since stock prices only respond to new information, which by definition arrives randomly, stock prices are said to follow a random walk.

# Market Efficiency

- One group of studies of strong-form market efficiency investigates insider trading.
- A number of studies support the view that insider trading is abnormally profitable.
- Thus, strong-form efficiency does not seem to be substantiated by the evidence

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Why Doesn't Everybody Believe the EMH?

- **There are optical illusions, mirages, and apparent patterns in charts of stock market returns.**
- **The truth is less interesting.**
- **There is some evidence against market efficiency:**
  - **Seasonality**
  - **Small versus Large stocks**
  - **Value versus growth stocks**
- **The tests of market efficiency are weak.**

Source: Ross et al. (2005), "Corporate Finance", 7th Edition, McGraw–Hill

# Efficient Markets

# Inefficient Markets

# Behavioral Finance

# Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

python101.ipynb - Colaboratory

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT?authuser=2#scrollTo=wsh36fLxDKC3

python101.ipynb

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```python
# Future Value
pv = 100
r = 0.1
n = 7
fv = pv * ((1 + (r)) ** n)
print(round(fv, 2))
```

```
194.87
```

[11]

```python
amount = 100
interest = 10 #10% = 0.01 * 10
years = 7

future_value = amount * ((1 + (0.01 * interest)) ** years)
print(round(future_value, 2))
```

```
194.87
```

[12]

```python
# Python Function def
def getfv(pv, r, n):
    fv = pv * ((1 + (r)) ** n)
    return fv
fv = getfv(100, 0.1, 7)
print(round(fv, 2))
```

```
194.87
```

[13]

```python
# Python if else
score = 80
if score >=60 :
    print("Pass")
else:
    print("Fail")
```

```
Pass
```

https://tinyurl.com/aintpupython101

# Summary

- **Event Studies in Finance**
- **Event Studies for Financial Research**
- **Event Study Methodology**
- **Efficient Market Hypothesis (EMH)**
  - **Efficient Markets**
  - **Inefficient Markets**

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