
# 15.401 Finance Theory I

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## *Lecture 11: Efficient Market Hypothesis*

- The Efficient Market Hypothesis (EMH)
- Implications of EMH
- Supportive evidence to EMH
- Challenges to EMH

**Readings:**

- Brealey, Myers and Allen, Chapter 14
- Bodie, Kane and Markus, Chapter 11

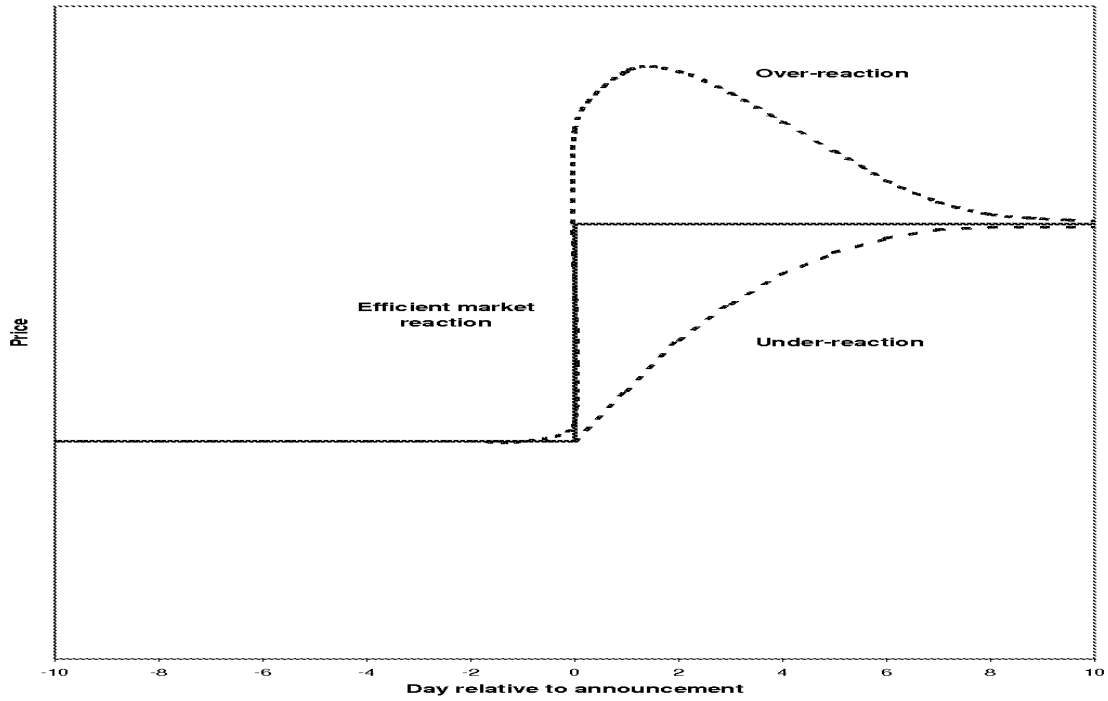
**Example.** Merck announces a new allergy drug to prevent hay-fever.

How should Merck's share price react to this news?

_ Increase immediately to a new equilibrium level

_ Increase gradually to the new equilibrium level

_ First over-shoot and then settle back to new equilibrium level.




What do you think?

Efficient Market Hypothesis: Market prices of securities reflect all available information about their value.

A precise definition of EMH needs to answer two questions:

1. What is ``all available information''?
2. What does it mean to ``reflect all available information''?

Answer:

1. All available information includes:
   - Past prices -- Weak form
   - Public information (prices, news, … ) -- Semi-Strong Form
   - All information including inside information -- Strong Form
2. ``Prices reflect all available information'' means that financial transactions at market prices, using the available information, are zero NPV activities.

**Implications of market efficiency:**

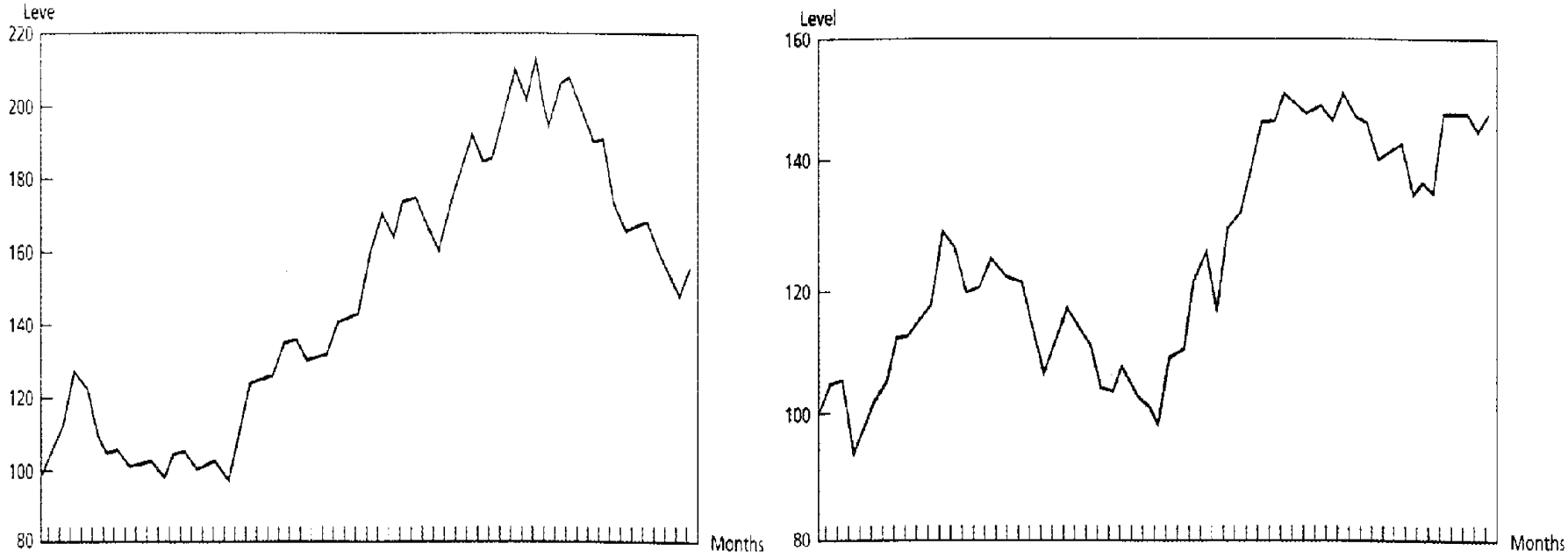
- No free lunch (no arbitrage) in financial markets
- Prices fully reflect all available information
- Prices follow random walks
- Trade-off between risk and expected return
- "Active" asset management does not add value

1. Weak form of EMH is supported by the data.

_ Technical trading rules are not consistently profitable.

S&P 500 Index (1980-1984) versus Coin-tossing

Source: R. Brealey and S. Myers, *Principles of Corporate Finance*.



- Serial correlation in daily stock returns is close to zero.

Serial Correlation of Daily Returns on Nine Stock Markets

Source: B. Solnik, ``A Note on the Validity of the Random Walk for European Stock Prices." *Journal of Finance* (December 1973).

| | | | |
|---|---|---|---|
| USA | 0.03 | UK | 0.08 |
| France | -0.01 | Italy | -0.02 |
| Germany | 0.08 | Holland | 0.03 |
| Belgium | -0.02 | Switzerland | 0.01 |
| Sweden | 0.06 | | |

**Example**. Trading can be hazardous to your wealth

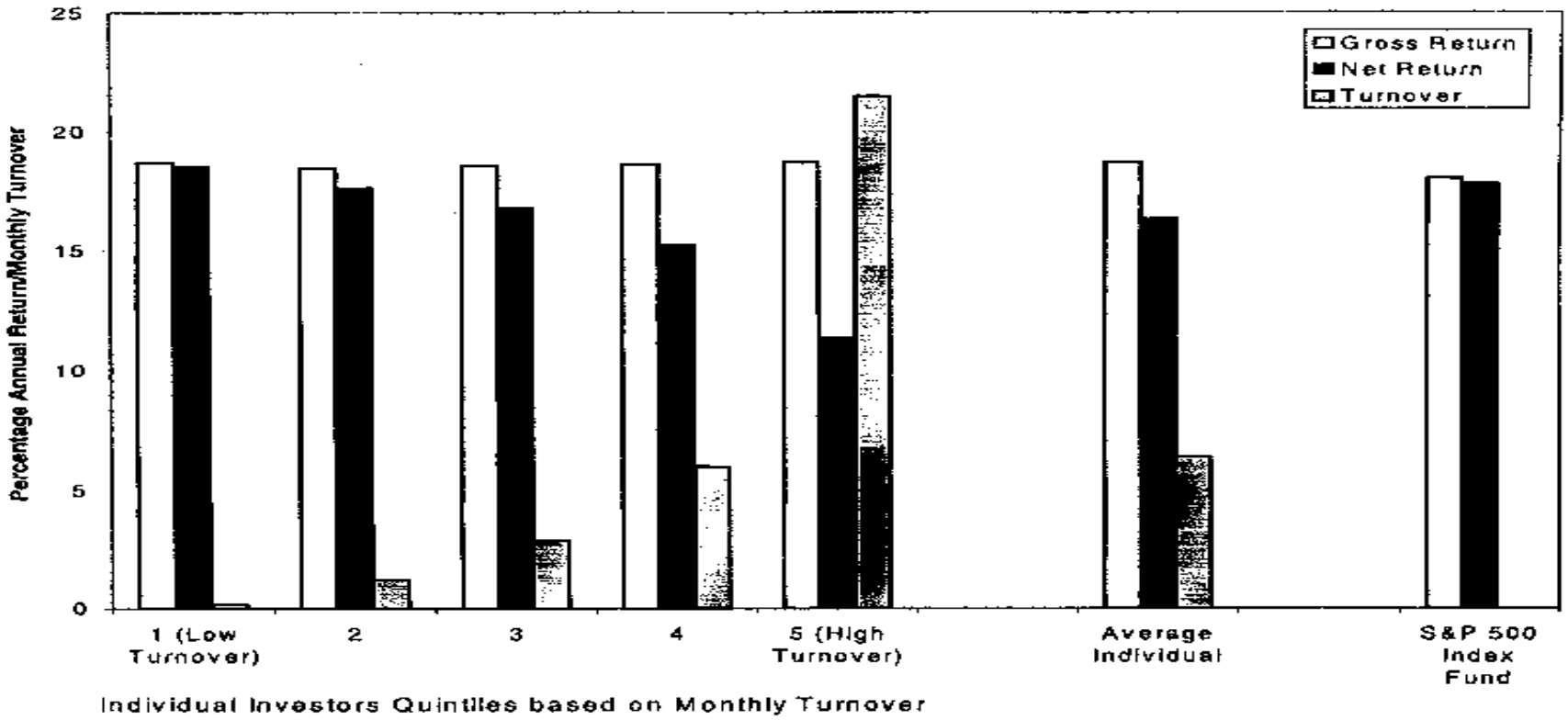



**Figure 1. Monthly turnover and annual performance of individual investors.** The white bar (black bar) represents the gross (net) annualized geometric mean return for February 1991 through January 1997 for individual investor quintiles based on monthly turnover, the average individual investor, and the S&P 500. The net return on the S&P 500 Index Fund is that earned by the Vanguard Index 500. The gray bar represents the monthly turnover.

(From B. Barber and T. Odean, Journal of Finance, 2000, 773-806.)

**Example**. Gender Issues in finance.

| | *Single* | | |
|---|---|---|---|
| | Men | Women | Difference |
| Average turnover | 84.6% | 50.6% | 34.0% |
| Abnormal gross return | -0.89% | -0.35% | -0.54% |
| Abnormal net return | -2.90% | -1.45% | -1.45% |

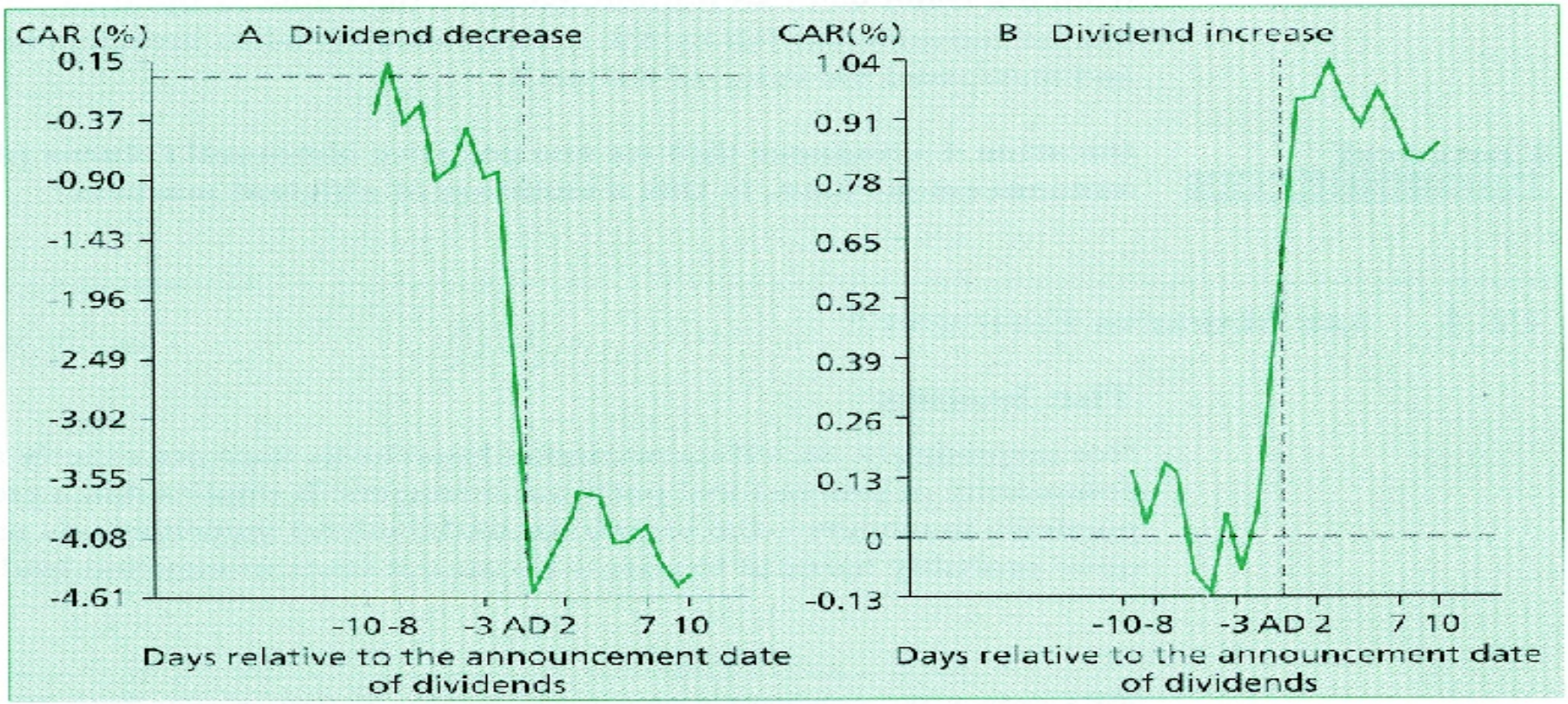
| | *Married* | | |
|---|---|---|---|
| | Men | Women | Difference |
| Average turnover | 73.3% | 52.9% | 23.4% |
| Abnormal gross return | -0.82% | -0.60% | -0.22% |
| Abnormal net return | -2.57% | -1.85% | -0.72% |

(From B. Barber and T. Odean, Quarterly Journal of Economics, 2001, 261-292.)

2. Semi-strong form of EMH is generally supported by the data.

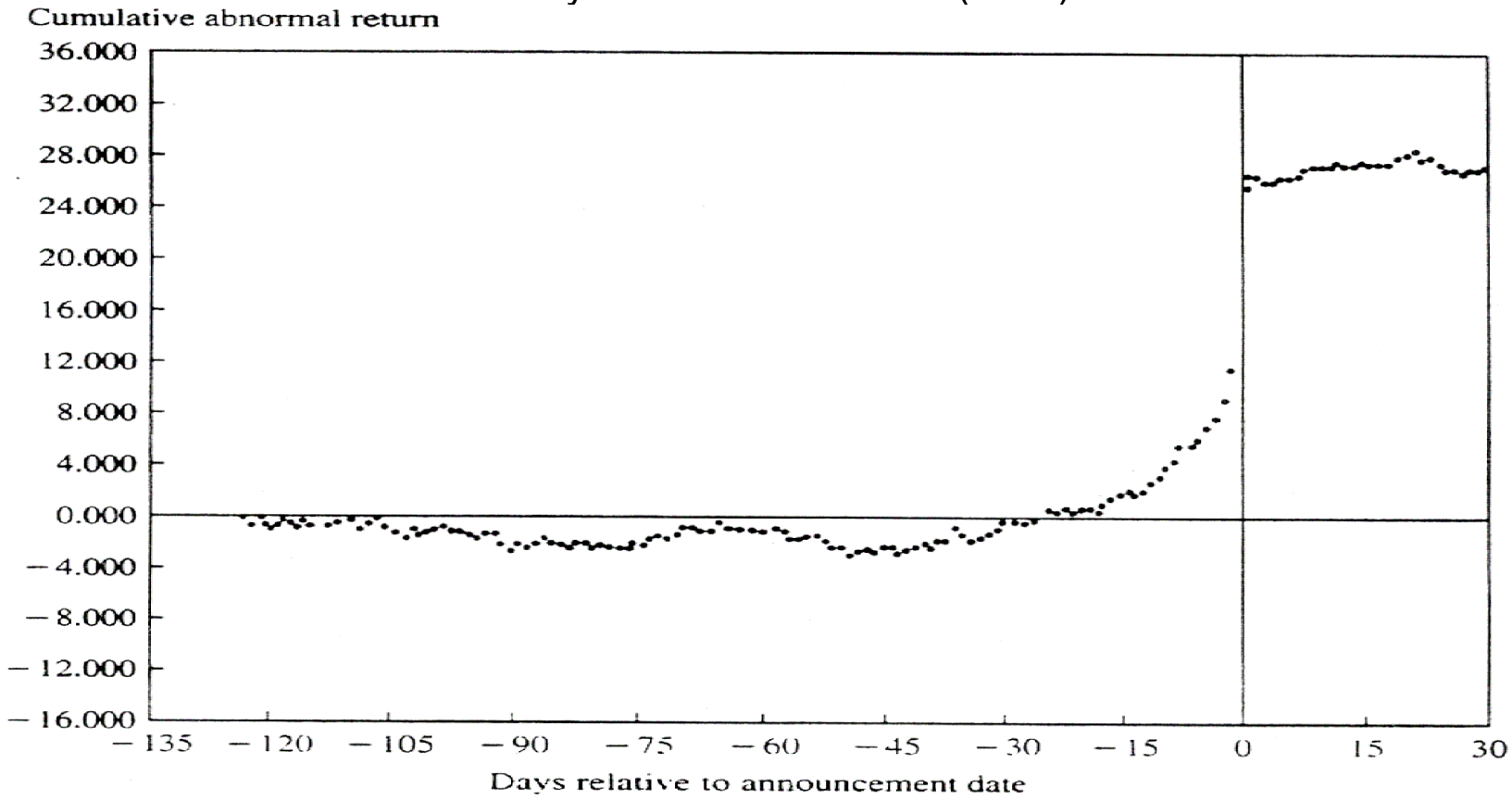
_ Prices react to news quickly (corporate actions, accounting changes ...

Cumulative Abnormal Returns (CAR) before and after Dividend Announcements



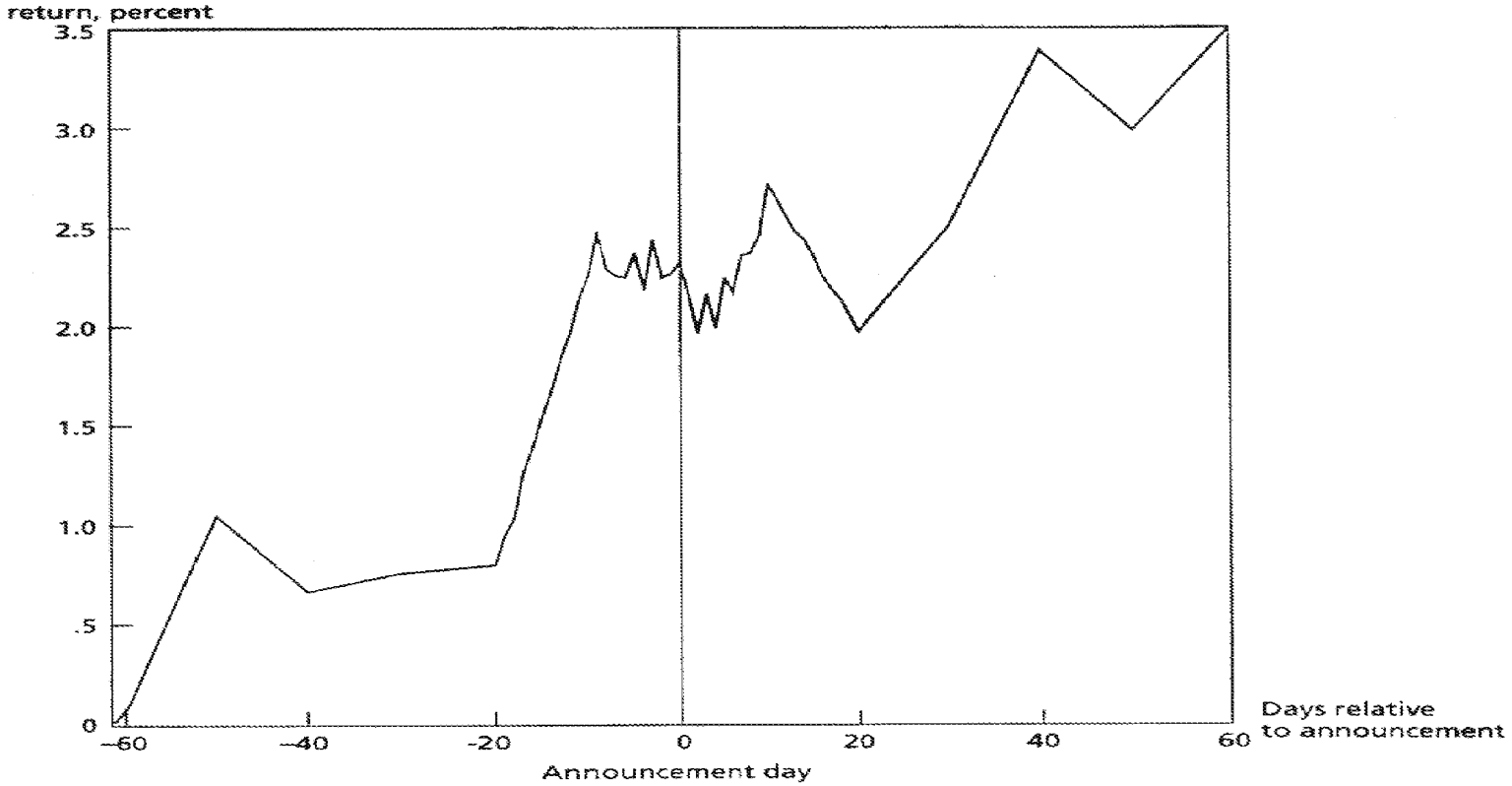
## Cumulative Abnormal Returns (CAR) before and after Takeover Attempts: Target Companies

Source: A. Keown and J. Pinkerton, "Merger Announcements and Insider Trading Activity." *Journal of Finance* (1981).



Price Changes when Firms Switch from Accelerated to Straight-line Depreciation (1955-1978)

Source: R.W. Houthausen, ``Evidence on the Effect of Bond Covenants and Management Compensation Contracts on the Choice of Accounting Techniques: The Case of the Depreciation Switch-Back.'' Journal of Accounting Review} (Vol. 3, 1981).

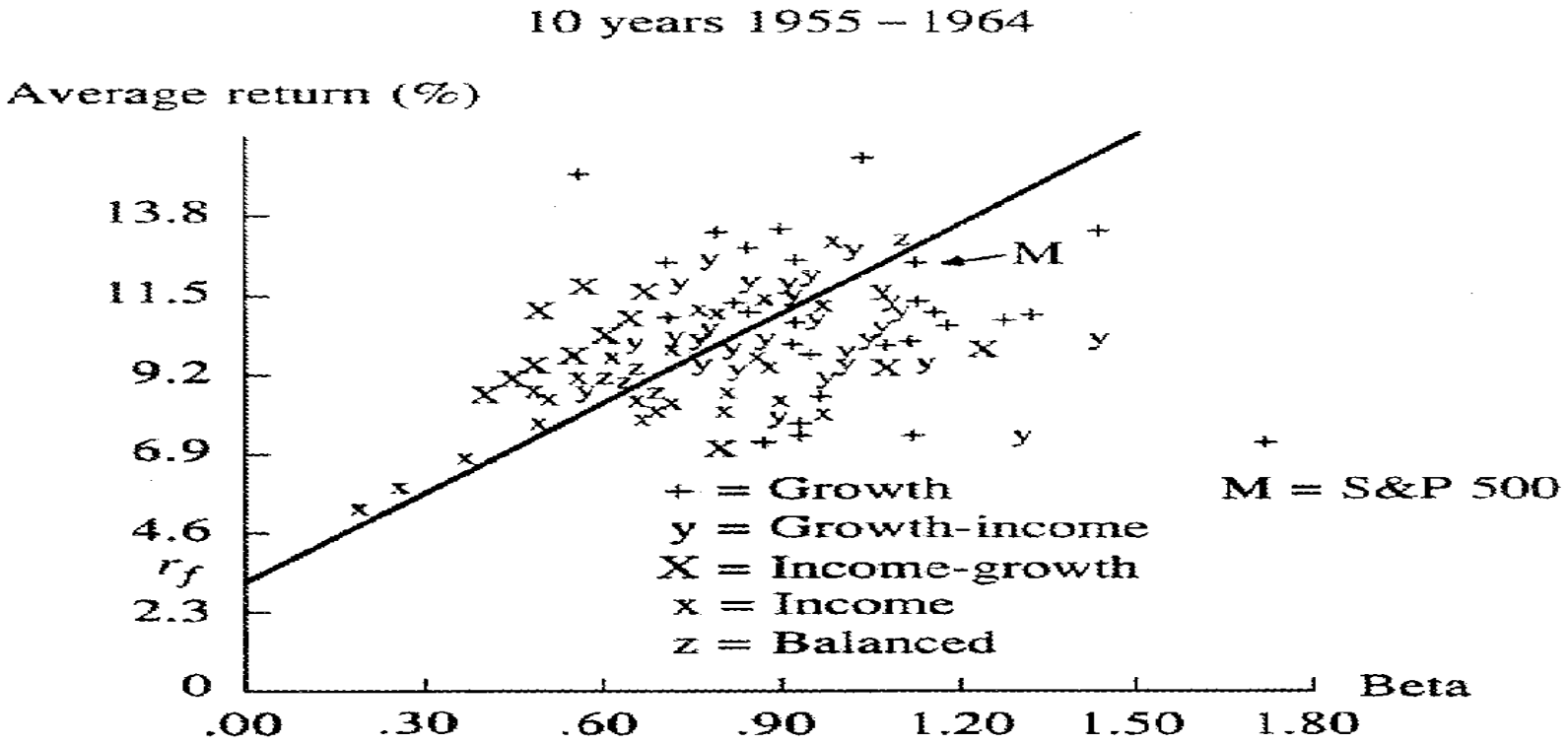


3. Strong-form of EMH has mixed evidence:

_ Money managers cannot consistently outperform.

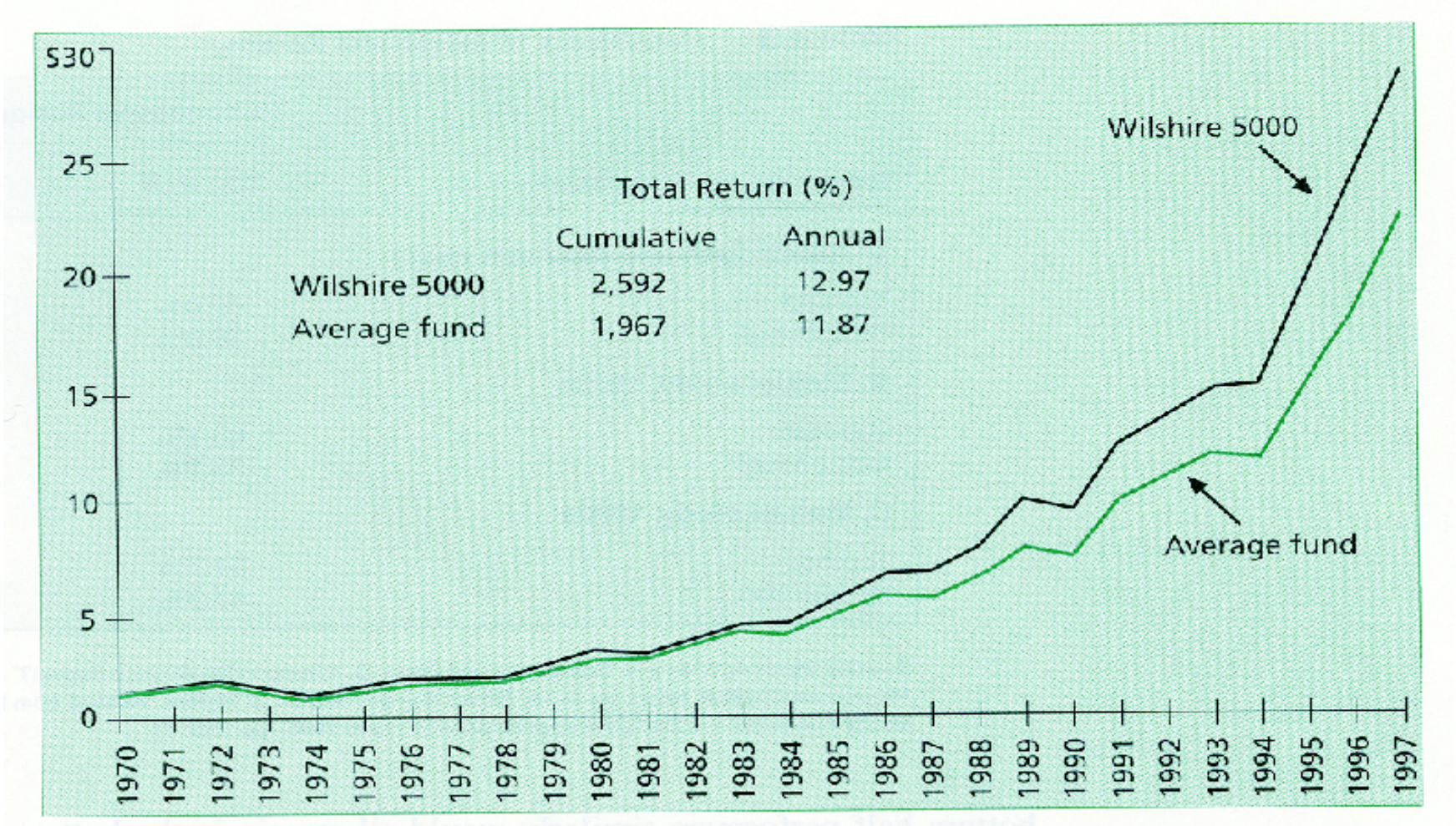
Mutual Fund Performance (Gross of Expenses)

Source: M. Jensen, ``Risks, the Pricing of Capital Assets, and the Evaluation of Investment Performance." *Journal of Business* (April 1969).



## Performance of Average Equity Mutual Funds

Source: J. Bogle, *Bogle on Mutual Funds*, Irwin (reprinted in BKM).



- Inside-trading is not profitable --- or is it?

Cumulative Abnormal Return (CAR) of Insider Trading

Source: L. Meulbroek, ``An Empirical Analysis of Illegal Insider trading." *Journal of Finance* (December 1992) .

| Type of inside information | N | Insider holding period (# of trading days) | CAR over holding period (%) |
|---|---|---|---|
| Takeover related | 145 | 12.5<br>(1.4) | 29.9<br>(1.5) |
| Negative earnings | 12 | 18.4<br>(7.6) | 30.0<br>(4.7) |
| Positive earnings | 3 | 21.3<br>(11.2) | 3.3<br>(4.2) |
| Bankruptcy | 10 | 26.4<br>(14.6) | 73.9<br>(12.0) |
| Misc. good news | 11 | 11.2<br>(7.7) | 34.8<br>(6.9) |
| Misc. bad news | 2 | 10.0<br>(7.0) | 28.1<br>(2.5) |
| Total | 183 | 13.7<br>(1.6) | 32.2<br>(1.7) |

Notes: The insider holding period begins with the first insider purchase or sale, and ends when the insider information becomes public. Standard errors are in parentheses.

1. Stock Market Crash of 1987.

a) Facts:

- No apparent exogenous news
- Enormous and dis-continuous price drop
- Worldwide
- No immediate bouncing back.

b) Suspects:

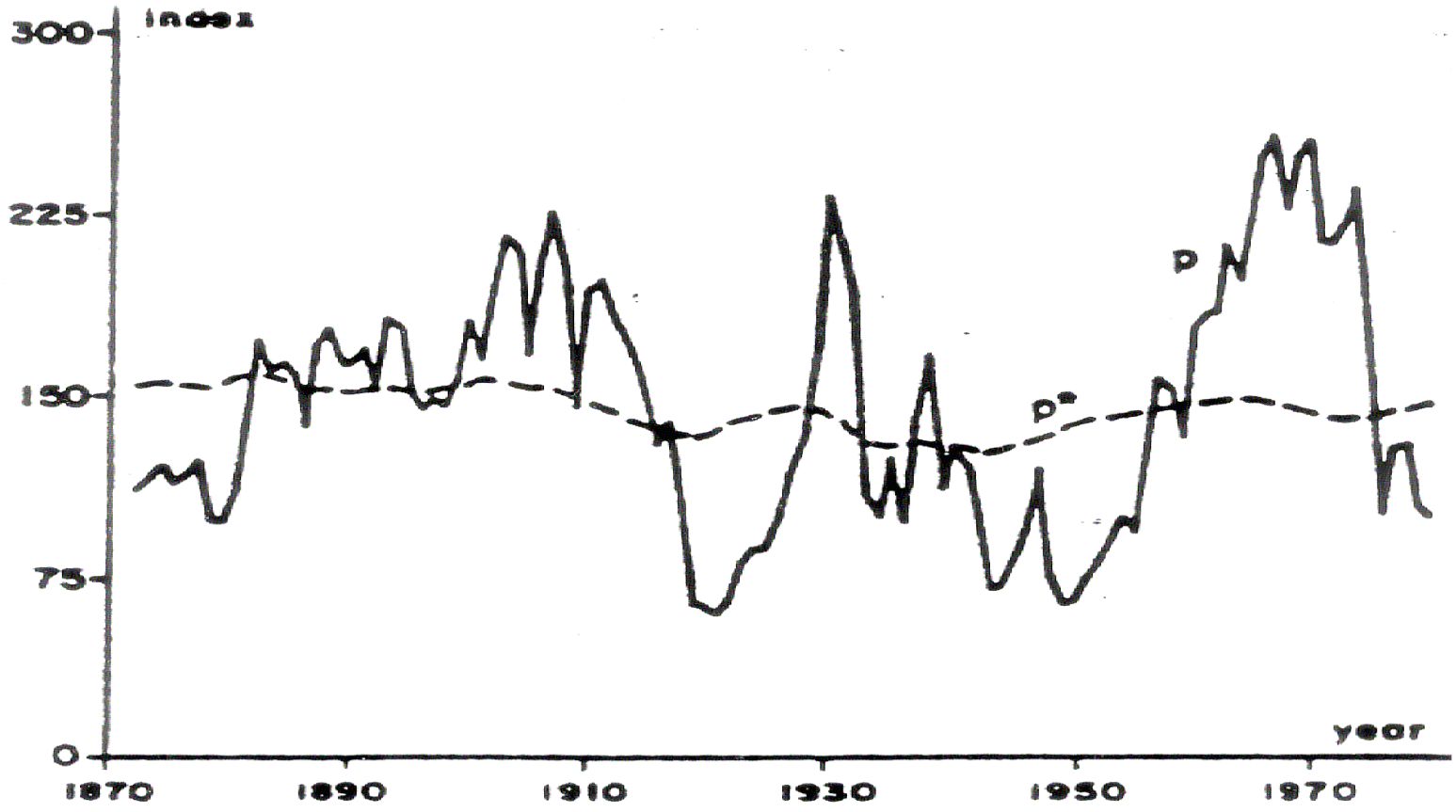
- Index arbitrageurs (actors or messengers?)
- Portfolio insurance
- Institutional selling.

1987 Stock Market Crash --- U.S. Market

2. Smooth dividends but volatile prices (Shiller).

Real S&P Index $p$ versus Ex Post Rational Price $p^*$ (1871-1979)

Source: R. Shiller, ``Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?" *American Economic Review* (Vol. 71, 1981).



1. How does information get into prices?
2. If prices reflect all available information, who has the incentive to collect costly information?
3. How about anomalies, crashes, crises?

**Practical Issues about EMH**

1. Transactions costs
2. Regulatory restrictions
3. Missing risk factors
4. Liquidity
5. Taxes
6. Micro vs. macro efficiency …

1. Trust market prices.
   - Buying and selling assets are zero NPV activities.
   - Market prices give best estimate of value for projects.
   - Firms receive “fair” value for securities they issue.
2. Read into prices.
   - If market price reflects all available information, we can extract information from prices.
3. There are no financial illusions.
   - Market price reflects value only from an asset's payoff.
   - It is not easy to trick the market.
4. Value comes from economic rents such as superior information, superior technology, access to cheap resources …

- The Efficient Market Hypothesis (EMH)
- Implications of EMH
- Supportive evidence to EMH
- Challenges to EMH
- Lessons from EMH