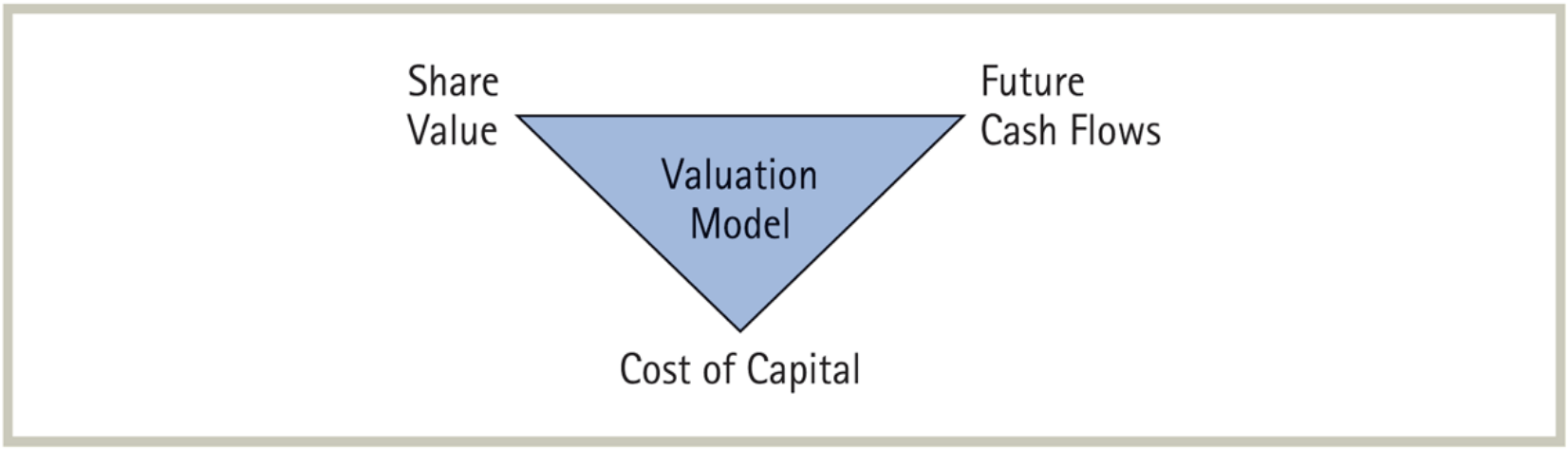
Efficient Markets Hypothesis

Information, Competition, and Stock Prices

- Information in Stock Prices



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- Information in Stock Prices
  - For a publicly traded firm, its current stock price should already provide very accurate information, aggregated from a multitude of investors, regarding the true value of its shares.

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Competition and Efficient Markets

- Efficient Markets Hypothesis (EMH)
  - Implies that securities will be fairly priced, based on their future cash flows.
  - Competition among capital market participants results in market prices that fully reflect all available information, and markets are thus informationally efficient.

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- Public, Easily Interpretable Information
  - If the impact of information that is available to all investors (news reports, financials statements, etc.) on the firm's future cash flows can be readily ascertained, then all investors can determine the effect of this information on the firm's value.
    - In this situation, we expect the stock price to react nearly instantaneously to such news.

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Stock Price Reactions to Public Information

Problem

Myox Labs announces that due to potential side effects, it is pulling one of its leading drugs from the market. As a result, its future expected free cash flow will decline by $85 million per year for the next ten years. Myox has 50 million shares outstanding, no debt, and an equity cost of capital of 8%. If this news came as a complete surprise to investors, what should happen to Myox's stock price upon the announcement?

Solution

In this case, we can use the discounted free cash flow method. With no debt, $r_{wacc} = r_E =$ 8%. Using the annuity formula, the decline in expected free cash flow will reduce Myox's enterprise value by

$$\$85 \text{ million} \times \frac{1}{0.08}\left(1 - \frac{1}{1.08^{10}}\right) = \$570 \text{ million}$$

Thus the share price should fall by $570 / 50 = $11.40 per share. Because this news is public and its effect on the firm's expected free cash flow is clear, we would expect the stock price to drop by this amount nearly instantaneously.

- Private or Difficult-to-Interpret Information
  - Private information will be held by a relatively small number of investors. These investors may be able to profit by trading on their information.
    - In this case, the efficient markets hypothesis will not hold in the strict sense. However, as these informed traders begin to trade, they will tend to move prices, so over time prices will begin to reflect their information as well.

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- Private or Difficult-to-Interpret Information
  - If the profit opportunities from having private information are large, others will devote the resources needed to acquire it.
    - In the long run, we should expect that the degree of "inefficiency" in the market will be limited by the costs of obtaining the private information.

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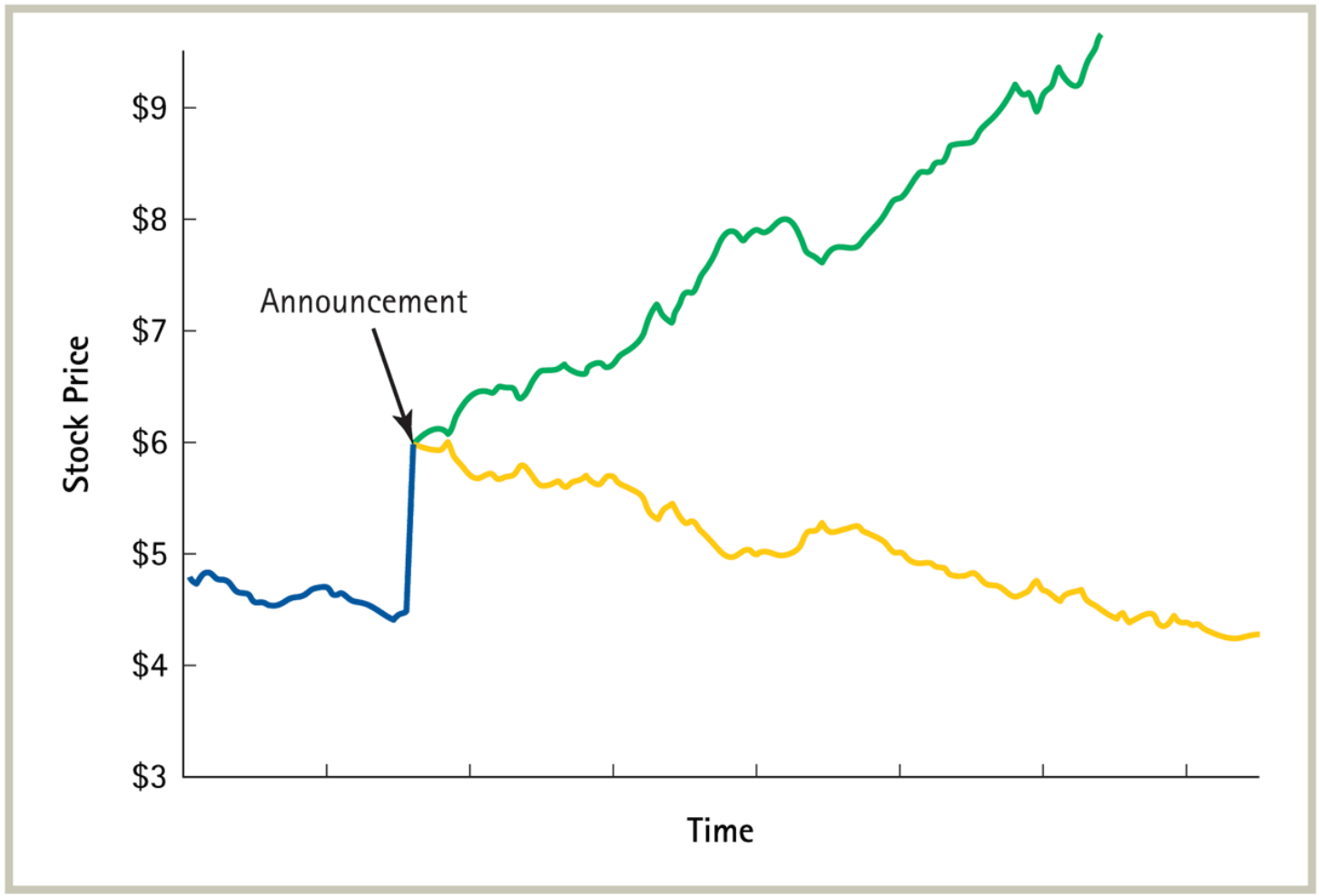
Stock Price Reactions to Private Information

Problem

Phenyx Pharmaceuticals has just announced the development of a new drug for which the company is seeking approval from the Food and Drug Administration (FDA). If approved, the future profits from the new drug will increase Phenyx's market value by $750 million, or $15 per share given its 50 million shares outstanding. If the development of this drug was a surprise to investors, and if the average likelihood of FDA approval is 10%, what do you expect will happen to Phenyx's stock price when this news is announced? What may happen to the stock price over time?

Possible Stock Price Paths



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Market Efficiency

- Prices are equal to the present value of expected future cash flows:

$$P_0 = \sum_{t=1}^{\infty} \frac{\mathrm{E}(CF_t)}{(1 + r_t)^t}$$

  where r_t is the appropriate discount rate (i.e., expected return) for the riskiness of CF_t.

- All new information about future cash flows is **immediately** and **correctly** incorporated into prices.
- Expected future rates of return on all securities are equal to appropriate risk-adjusted discount rates at all times.
  - You can't earn extra returns without taking on extra risk.

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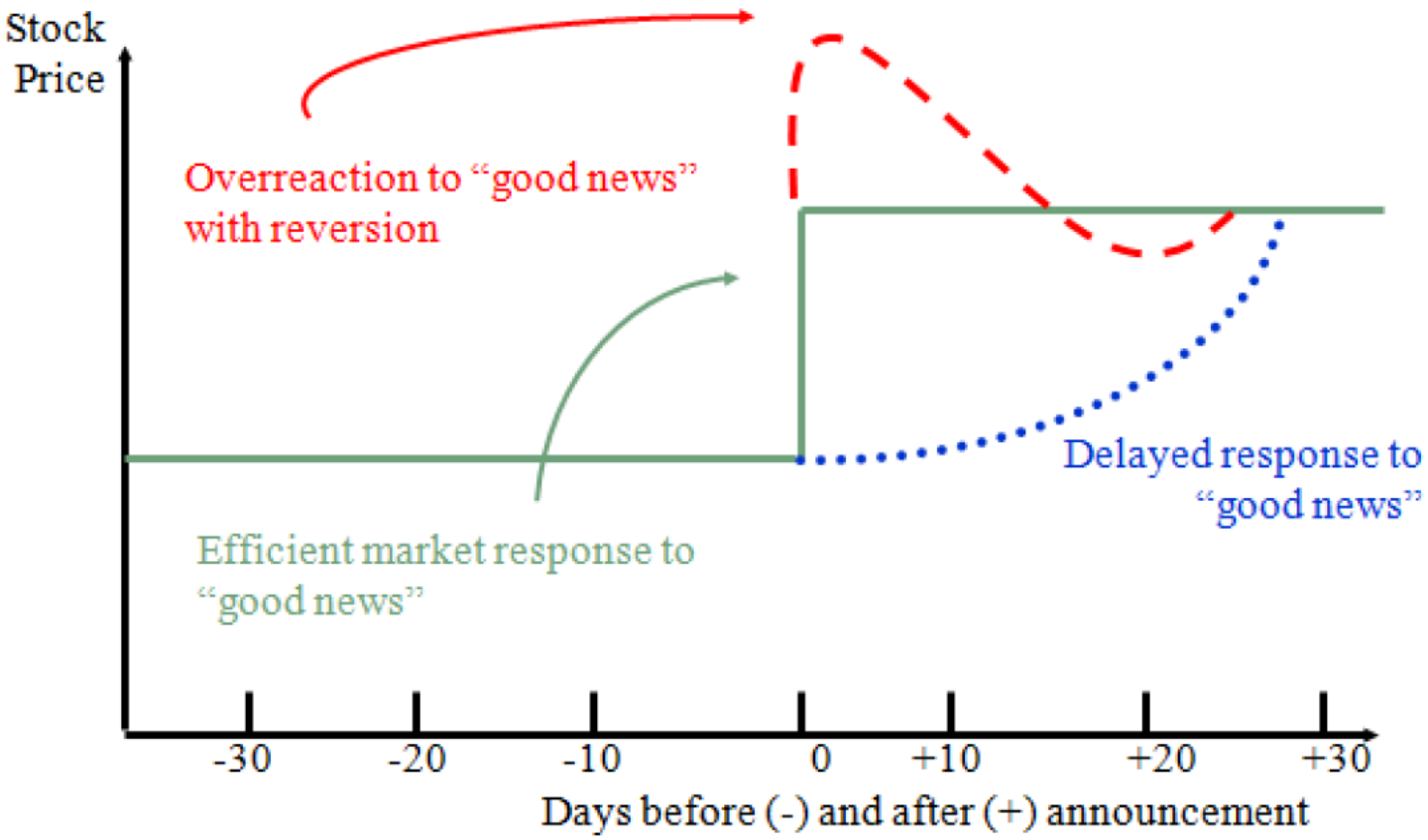
Reaction of Stock Price to New Information in Efficient and Inefficient Markets



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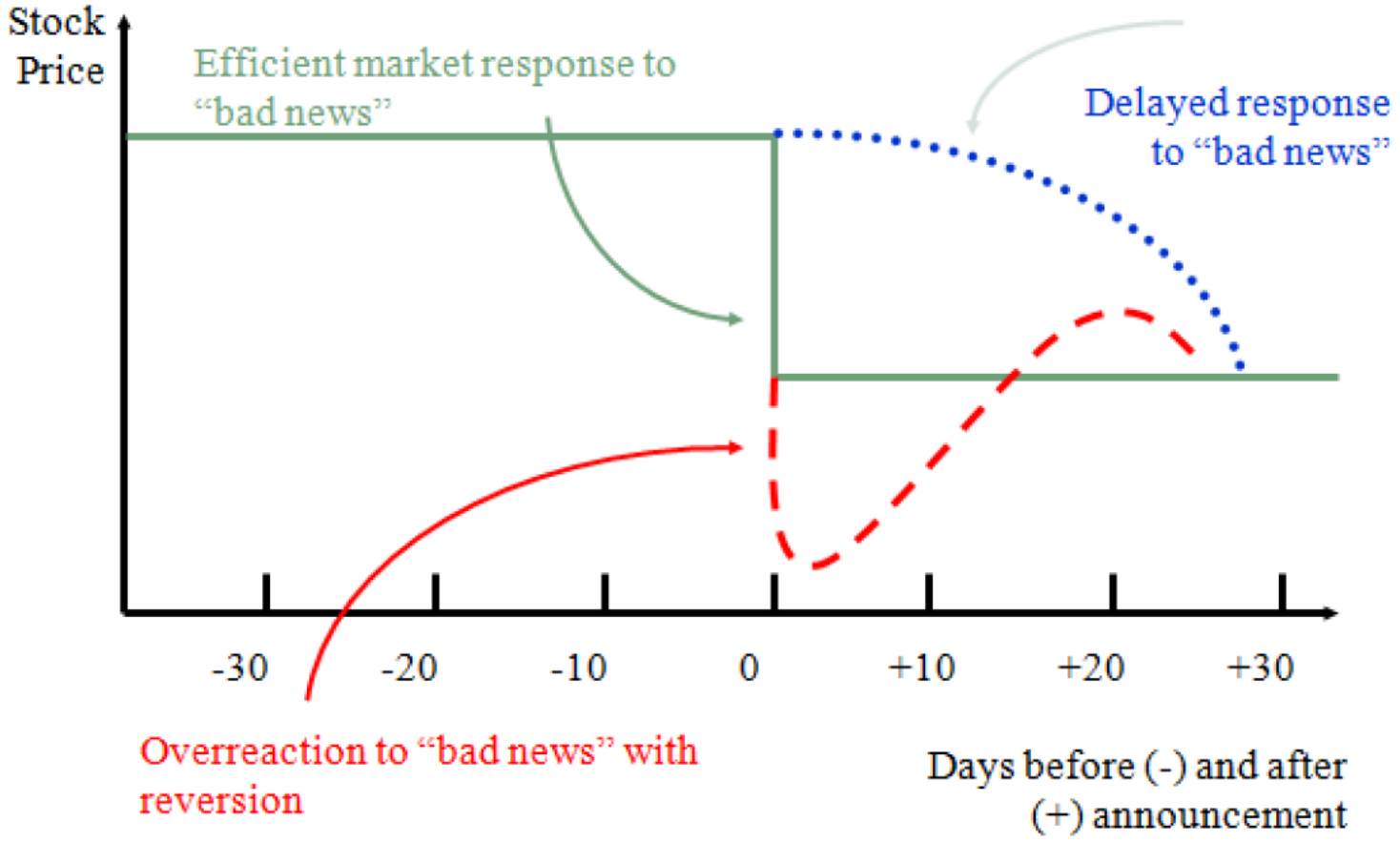
Stock Price
Efficient market response to "bad news"
Delayed response to "bad news"
-30
-20
-10
0
+10
+20
+30
Overreaction to "bad news" with reversion
Days before (-) and after (+) announcement

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The Paradox of Efficient Markets

- The Paradox:
- If information is already in prices, why would anyone spend resources gathering costly information?
- If nobody gathers information, how does information get reflected in prices?

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Implications for Investors (1)

- If stocks are fairly priced, then investors who buy stocks can expect to receive future cash flows that fairly compensate them for the risk of their investment.
- An optimal portfolio is a passive, well diversified portfolio:
  - Stock picking and market timing do not add value.
  - Don't invest in an actively managed mutual fund with high expenses.

Implications for Investors (2)

- Fundamental and Technical Analysis do not add value.
  - This information is already incorporated into prices.
  - Don't pay for analysts' recommendations and don't trade based on
  - analysts' recommendations. Moving away from a well diversfiied portfolio wiill get you extra risk, but no extra return!

Implications for Investors (3)

- Don't buy or sell after the arrival of news: If the market responds quickly to new information, by the time you go to buy or sell, the price will already have moved fully in response to the news.

Implications for Corporate Managers (1)

- Take all positive NPV projects.
  - That is, maximize the present value of the firm's future cash flows.
- When you announce a good new project, your firm's market value will jump up by the (unanticipated) NPV of the project.
  - Hence, maximizing shareholder value and maximizing NPV are the same thing.

Implications for Corporate Managers (2)

- Firms should expect to receive the fair value for securities that they sell. Fair means that the price they receive for the securities they issue is the present value.
- Thus, valuable financing opportunities that arise from fooling investors are unavailable in efficient markets.
- The price of a company's stock cannot be affected by a change in accounting.

Efficient markets when information is costly

- With costly information acquisition, markets can not be perfectly efficient. Otherwise, there would be no reward for people carrying information into the market.
- Carrying information into the market can be a business, but there is no free lunch. You have to incur the cost of information acquisition. After costs, you do not earn a risk-adjusted abnormal return.

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The Different Types of Market Efficiency

- Weak Form Efficiency
- Semi-Strong Form Efficiency
- Strong Form Efficiency

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Weak Form Efficiency

- Security prices reflect all information found in past prices.
  - Since stock prices only respond to new information, which by definition arrives randomly, stock prices are said to follow a random walk in a market with Weak Form Efficiency.

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If the weak form of market efficiency holds, then technical analysis is of no value.

Semi-Strong Form Efficiency

- Security prices reflect all publicly available information.

- Public information include:
  - Historical price and volume information
  - Published accounting statements.
  - Information found in annual reports.

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Strong Form Efficiency

- Security prices reflect all information public and private.
  - Strong form efficiency incorporates weak and semi-strong form efficiency.
  - Strong form efficiency says that anything pertinent to the stock and known to at least one investor is already incorporated into the security's price.

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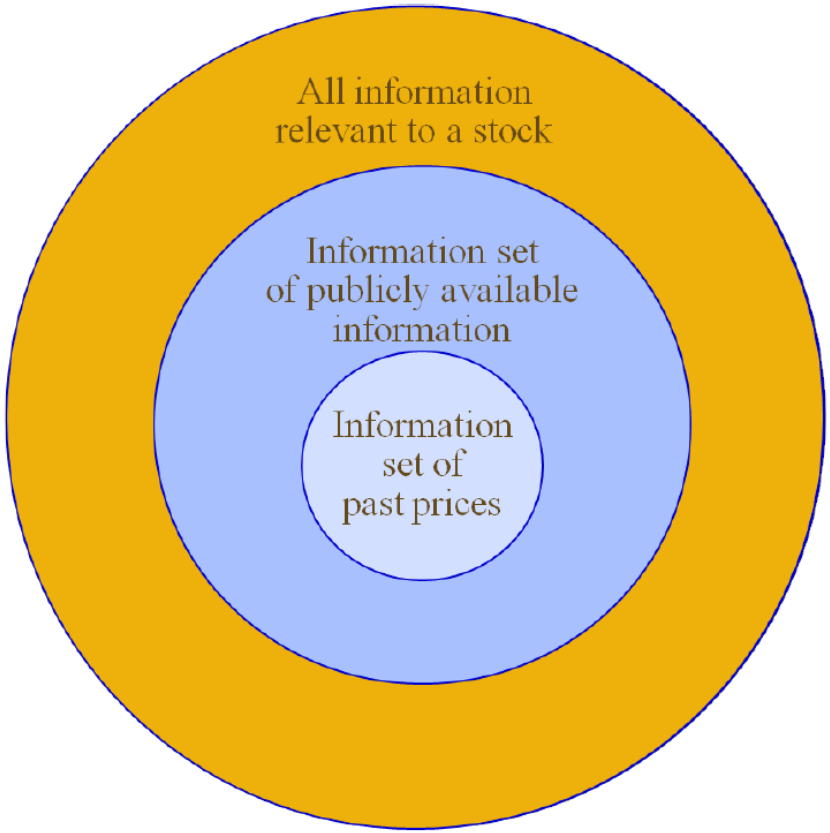
Relationship among Three Different Information Sets



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Tests for Market Efficiency

- We investigate market efficiency by asking the following questions:
  - Weak Form Efficient:
    - Can analysis of past price information be used to make abnormally high returns?
  - Semi-Strong Form Efficient:
    - Can public information be used to make abnormal returns?
  - Strong-Form Efficient:
    - Can private information be used to make abnormal returns?

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The abnormal return is the difference between the observed stock return and the predicted return from some asset pricing model. For example, using the market model, we can define asset i's abnormal return $\varepsilon_{i,t}$ as:

$$\varepsilon_{i,t} = r_{i,t} - \left(\alpha_i + \beta_i r_{m,t}\right)$$

If markets are efficient, abnormal returns $\varepsilon_{i,t}$ should be unpredictable using all current and past information.

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Tests for Weak Form Efficiency

- Weak form efficiency requires that past realized stock returns can't be used to predict future abnormal returns.

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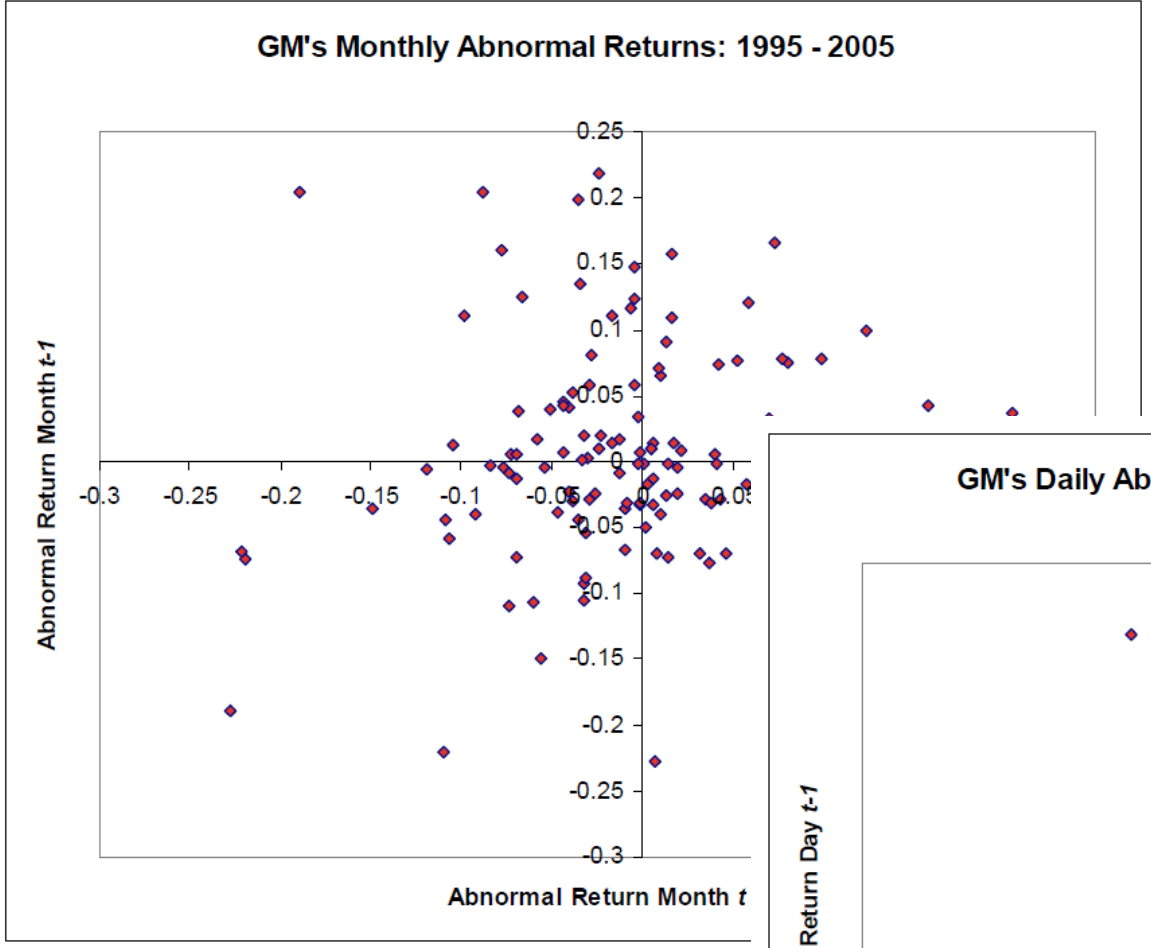
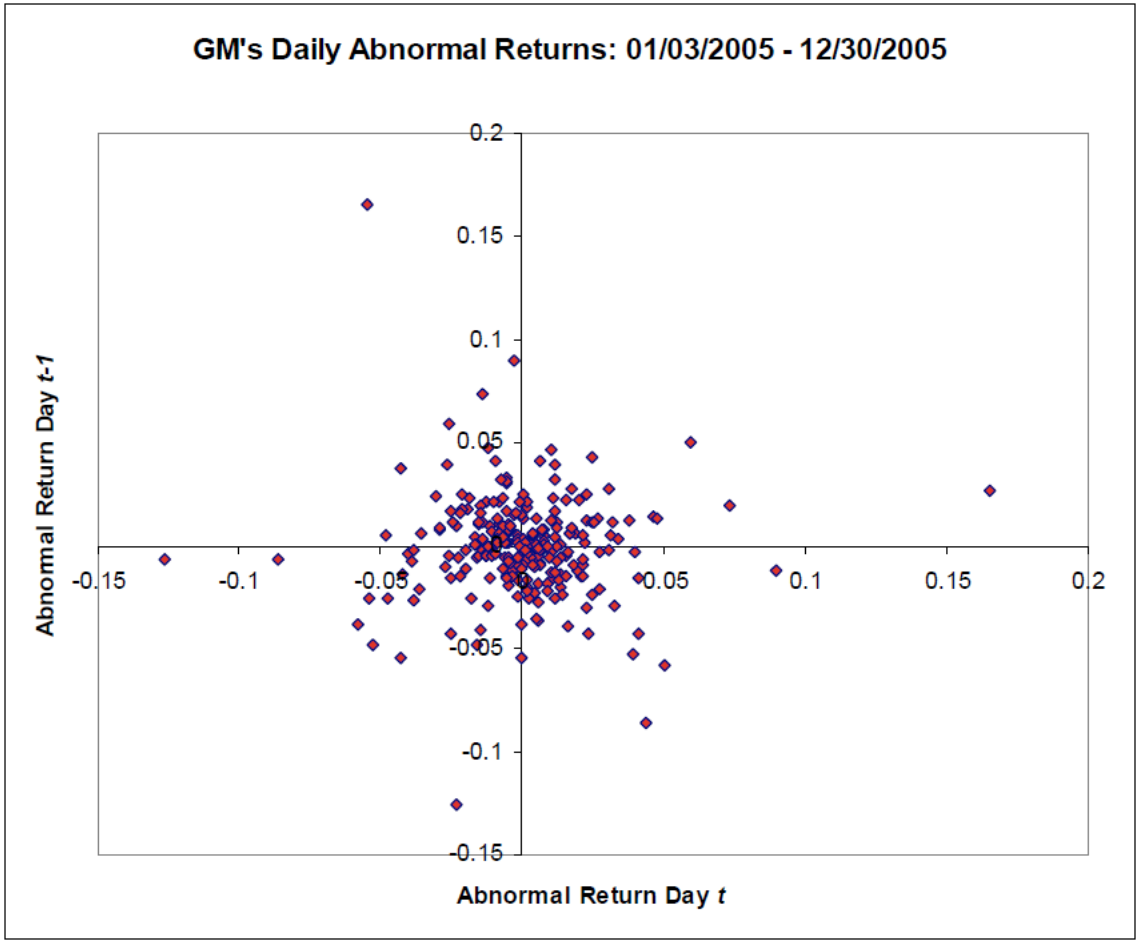

GM's Monthly Abnormal Returns: 1995 - 2005
Abnormal Return Month t-1
Abnormal Return Month t
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.3
-0.25
-0.2
-0.15
-0.1


GM's Daily Abnormal Returns: 01/03/2005 - 12/30/2005
Abnormal Return Day t-1
Abnormal Return Day t
0.2
0.15
0.1
0.05
-0.05
-0.1
-0.15
-0.15
-0.1
-0.05
0.05
0.1
0.15
0.2

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Tests for Semi-Strong Form Efficiency

- Since mutual fund managers pick stocks based on publicly available information, a test of semi-strong form efficiency is to look at the performance of mutual funds.

- Do some mutual funds persistently outperform?

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Star Performer?

Peter Lynch (manager of Fidelity's Magellan Fund) beat the S&P 500 in 11 of the 13 years in the 1977-1989 period with an annual return of 29%.

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TABLE 9.5 Probabilities of Transition from One Quartile to Another

	Ranking Next Period			
Ranking This Period	*1*	*2*	*3*	*4*
1	26%	24%	23%	27%
2	20%	26%	29%	25%
3	22%	28%	26%	24%
4	32%	22%	22%	24%

There is very little evidence that past success is related to future success

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Tests for Strong Form Efficiency

- Managers are legally permitted to buy and sell shares in their own firms (but not just before any announcements).

- They are required to report trades to the SEC:
  - Before Sarbanes-Oxley Act, insiders were required to report all trades to the SEC by the 10th day of the month following the transaction.
  - Under Sarbanes-Oxley Act, report within two business days of the transaction.

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- 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.

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The Efficient Markets Hypothesis Versus No Arbitrage

- The efficient markets hypothesis states that securities with *equivalent risk* should have the *same expected return*.
- No arbitrage opportunity is that two securities with *identical cash flows* should have *the same prices*.

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Summary and Conclusions

- An efficient market incorporates information in security prices.
- There are three forms of the EMH:
  - Weak Form EMH: Security prices reflect past price data.
  - Semi-strong Form EMH: Security prices reflect publicly available information.
  - Strong Form EMH: Security prices reflect all information.

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End of Lesson