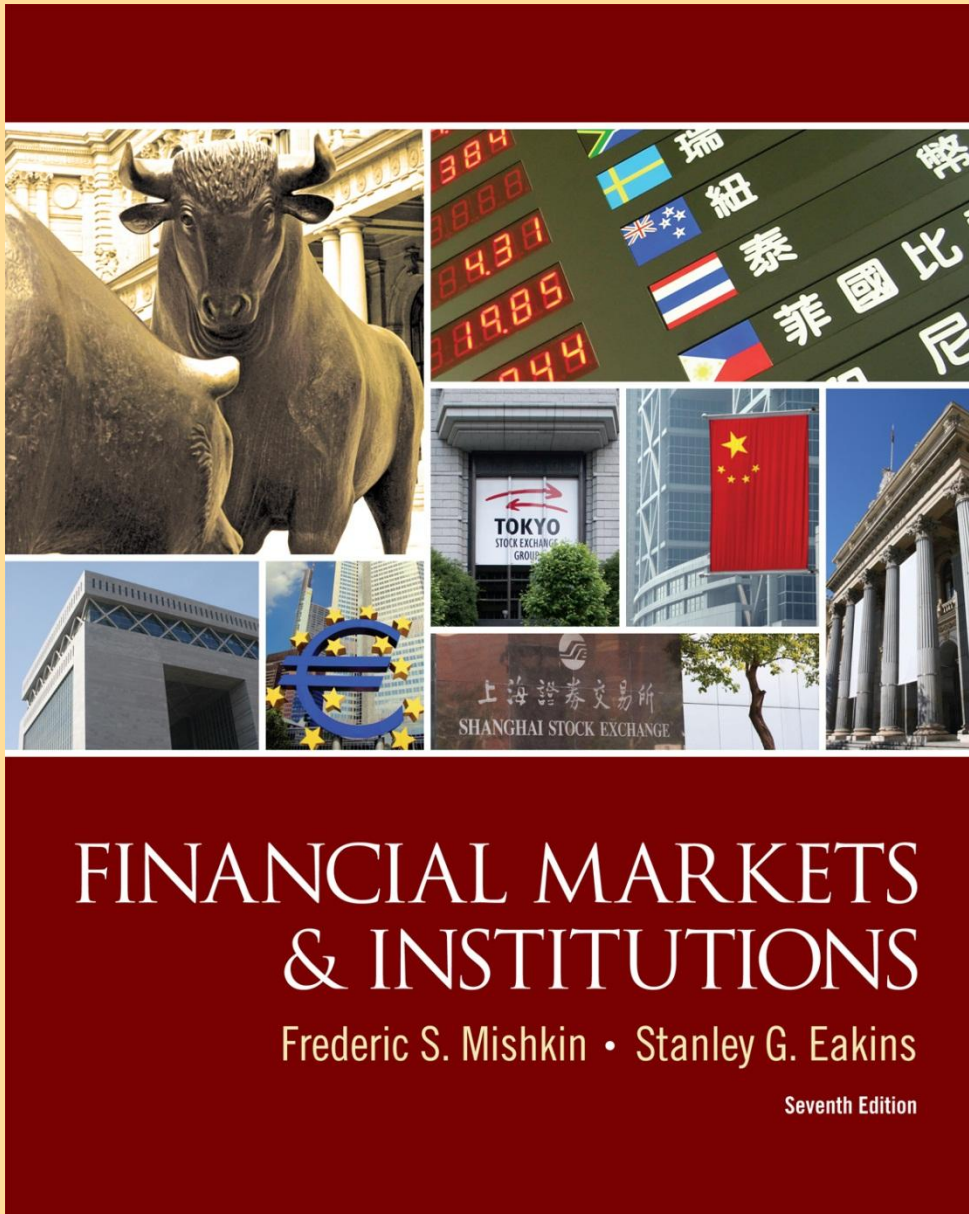


# CHAPTER 6

## Are Financial Markets Efficient?



# FINANCIAL MARKETS & INSTITUTIONS

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# Chapter Preview

- Expectations are very important in our financial system.
  - Expectations of returns, risk, and liquidity impact asset demand
  - Inflationary expectations impact bond prices
  - Expectations not only affect our understanding of markets, but also how financial institutions operate.



# Chapter Preview

- To better understand expectations, we examine the *efficient markets hypothesis*.
  - Framework for understanding what information is useful and what is not
  - However, we need to validate the hypothesis with real market data. The results are mixed, but generally supportive of the idea.



# Chapter Preview

- In sum, we will look at the basic reasoning behind the efficient market hypothesis. We also examine empirical evidence examining this idea. Topics include:
  - The Efficient Market Hypothesis
  - Evidence on the Efficient Market Hypothesis
  - Behavioral Finance



# Efficient Market Hypothesis

- Recall from Chapter 3 that the rate of return for any position is the sum of the capital gains ( $P_{t+1} - P_t$ ) plus any cash payments ( $C$ ):

$$R = \frac{P_{t+1} - P_t + C}{P_t}$$

- At the start of a period, the unknown element is the future price:  $P_{t+1}$ . But, investors do have some expectation of that price, thus giving us an *expected rate of return*.

$$R^e = \frac{P_{t+1}^e - P_t + C}{P_t}$$



# Efficient Market Hypothesis

The Efficient Market Hypothesis views the expectations as equal to optimal forecasts using all available information.

This implies:

$$P_{t+1}^e = P_{t+1}^{of} \rightarrow R^e = R^{of}$$

Assuming the market is in equilibrium:

$$R^e = R^*$$

Put these ideas together: ***efficient market hypothesis***

$$R^{of} = R^*$$



# Efficient Market Hypothesis

$$R^{of} = R^*$$

- This equation tells us that ***current prices in a financial market will be set so that the optimal forecast of a security's return using all available information equals the security's equilibrium return.***
- Financial economists state it more simply: A security's price fully reflects all available information in an efficient market.



# Example 6.1: The Efficient Market Hypothesis

## EXAMPLE 6.1 The Efficient Market Hypothesis

Suppose that a share of Microsoft had a closing price yesterday of \$90, but new information was announced after the market closed that caused a revision in the forecast of the price for next year to go to \$120. If the annual equilibrium return on Microsoft is 15%, what does the efficient market hypothesis indicate the price will go to today when the market opens? (Assume that Microsoft pays no dividends.)

### Solution

The price would rise to \$104.35 after the opening.

$$R^{\text{of}} = \frac{P_{t+1}^{\text{of}} - P_t + C}{P_t} = R^*$$

where

$R^{\text{of}}$  = optimal forecast of the return = 15% = 0.15

$R^*$  = equilibrium return = 15% = 0.15

$P_{t+1}^{\text{of}}$  = optimal forecast of price next year = \$120

$P_t$  = price today after opening

$C$  = cash (dividend) payment = 0



# Rationale Behind the Hypothesis

- When an **unexploited profit opportunity** arises on a security (so-called because, on average, people would be earning more than they should, given the characteristics of that security), investors will rush to buy until the price rises to the point that the returns are normal again.



# Rationale Behind the Hypothesis (cont.)

- In an efficient market, all unexploited profit opportunities will be eliminated.
- Not every investor need be aware of every security and situation, as long as a few keep their eyes open for unexploited profit opportunities, they will eliminate the profit opportunities that appear because in so doing, they make a profit.

# Rationale Behind the Hypothesis (cont.)

- Why **efficient market hypothesis** makes sense

If  $R^{of} > R^* \rightarrow P_t \uparrow \rightarrow R^{of} \downarrow$

If  $R^{of} < R^* \rightarrow P_t \downarrow \rightarrow R^{of} \uparrow$

Until  $R^{of} = R^*$

- All unexploited profit opportunities eliminated
- Efficient market condition holds even if there are uninformed, irrational participants in market



# Stronger Version of the Efficient Market Hypothesis

- Many financial economists take the EMH one step further in their analysis of financial markets. Not only do they define an efficient market as one in which expectations are optimal forecasts using all available information, but they also add the condition that an efficient market is one in which prices are always correct and reflect **market fundamentals** (items that have a direct impact on future income streams of the securities)



# Stronger Version of the Efficient Market Hypothesis (2)

This stronger view of market efficiency has several important implications in the academic field of finance:

1. It implies that in an efficient capital market, one investment is as good as any other because the securities' prices are correct.
2. It implies that a security's price reflects all available information about the intrinsic value of the security.



# Stronger Version of the Efficient Market Hypothesis (2)

3. It implies that security prices can be used by managers of both financial and nonfinancial firms to assess their cost of capital (cost of financing their investments) accurately and hence that security prices can be used to help them make the correct decisions about whether a specific investment is worth making or not.



# Evidence on Efficient Market Hypothesis

- Favorable Evidence

1. Investment analysts and mutual funds don't beat the market
2. Stock prices reflect publicly available info: anticipated announcements don't affect stock price
3. Stock prices and exchange rates close to random walk; if predictions of  $\Delta P$  big,  $R^{of} > R^* \Rightarrow$  predictions of  $\Delta P$  small
4. Technical analysis does not outperform market



# Evidence in Favor of Market Efficiency

- **Performance of Investment Analysts and Mutual Funds should not be able to consistently beat the market**
  - The “Investment Dartboard” often beats investment managers.
  - Mutual funds not only do not outperform the market on average, but when they are separated into groups according to whether they had the highest or lowest profits in a chosen period, the mutual funds that did well in the first period do not beat the market in the second period.





# Evidence in Favor of Market Efficiency

- **Performance of Investment Analysts and Mutual Funds should not be able to consistently beat the market**
  - Investment strategies using inside information is the only “proven method” to beat the market. In the U.S., it is illegal to trade on such information, but that is not true in all countries.



# Evidence in Favor of Market Efficiency

- **Do Stock Prices Reflect Publicly Available Information as the EMH predicts they will?**
  - Thus if information is already publicly available, a positive announcement about a company will not, on average, raise the price of its stock because this information is already reflected in the stock price.



# Evidence in Favor of Market Efficiency

- **Do Stock Prices Reflect Publicly Available Information as the EMH predicts they will?**
  - Early empirical evidence confirms: favorable earnings announcements or announcements of stock splits (a division of a share of stock into multiple shares, which is usually followed by higher earnings) do not, on average, cause stock prices to rise.



# Evidence in Favor of Market Efficiency

- **Random-Walk Behavior of Stock Prices that is, future changes in stock prices should, for all practical purposes, be unpredictable**
  - If stock is predicted to rise, people will buy to equilibrium level; if stock is predicted to fall, people will sell to equilibrium level (both in concert with EMH)
  - Thus, *if stock prices were predictable*, thereby causing the above behavior, price changes would be near zero, which has not been the case historically



# Evidence in Favor of Market Efficiency

- **Technical Analysis means to study past stock price data and search for patterns such as trends and regular cycles, suggesting rules for when to buy and sell stocks**
  - The EMH suggests that technical analysis is a waste of time
  - The simplest way to understand why is to use the random-walk result that holds that past stock price data cannot help predict changes
  - Therefore, technical analysis, which relies on such data to produce its forecasts, cannot successfully predict changes in stock prices



# Case: Foreign Exchange Rates

- Could you make a bundle if you could predict FX rates? Of course.
- EMH predicts, then, that FX rates should be unpredictable.
- Oddly enough, that is exactly what empirical tests show—FX rates are not very predictable.



# Evidence on Efficient Market Hypothesis

- Unfavorable Evidence
  1. Small-firm effect: small firms have abnormally high returns
  2. January effect: high returns in January
  3. Market overreaction
  4. Excessive volatility
  5. Mean reversion
  6. New information is not always immediately incorporated into stock prices
- Overview
  - Reasonable starting point but not whole story

# Evidence Against Market Efficiency



- **The Small-Firm Effect is an anomaly. Many empirical studies have shown that small firms have earned abnormally high returns over long periods of time, even when the greater risk for these firms has been considered.**
  - The small-firm effect seems to have diminished in recent years but is still a challenge to the theory of efficient markets
  - Various theories have been developed to explain the small-firm effect, suggesting that it may be due to rebalancing of portfolios by institutional investors, tax issues, low liquidity of small-firm stocks, large information costs in evaluating small firms, or an inappropriate measurement of risk for small-firm stocks



# Evidence Against Market Efficiency



- **The January Effect is the tendency of stock prices to experience an abnormal positive return in the month of January that is predictable and, hence, inconsistent with random-walk behavior**

# Evidence Against Market Efficiency



- Investors have an incentive to sell stocks before the end of the year in December because they can then take capital losses on their tax return and reduce their tax liability. Then when the new year starts in January, they can repurchase the stocks, driving up their prices and producing abnormally high returns.
- Although this explanation seems sensible, it does not explain why institutional investors such as private pension funds, which are not subject to income taxes, do not take advantage of the abnormal returns in January and buy stocks in December, thus bidding up their price and eliminating the abnormal returns.

# Evidence Against Market Efficiency



- **Market Overreaction:** recent research suggests that stock prices may overreact to news announcements and that the pricing errors are corrected only slowly
  - When corporations announce a major change in earnings, say, a large decline, the stock price may overshoot, and after an initial large decline, it may rise back to more normal levels over a period of several weeks.
  - This violates the EMH because an investor could earn abnormally high returns, on average, by buying a stock immediately after a poor earnings announcement and then selling it after a couple of weeks when it has risen back to normal levels.

# Evidence Against Market Efficiency



- **Excessive Volatility:** the stock market appears to display excessive volatility; that is, fluctuations in stock prices may be much greater than is warranted by fluctuations in their fundamental value.
  - Researchers have found that fluctuations in the S&P 500 stock index could not be justified by the subsequent fluctuations in the dividends of the stocks making up this index.
  - Other research finds that there are smaller fluctuations in stock prices when stock markets are closed, which has produced a consensus that stock market prices appear to be driven by factors other than fundamentals.

# Evidence Against Market Efficiency



- **Mean Reversion:** Some researchers have found that stocks with low returns today tend to have high returns in the future, and vice versa.
  - Hence stocks that have done poorly in the past are more likely to do well in the future because mean reversion indicates that there will be a predictable positive change in the future price, suggesting that stock prices are not a random walk.
  - Newer data is less conclusive; nevertheless, mean reversion remains controversial.

# Evidence Against Market Efficiency



- **New Information Is Not Always Immediately Incorporated into Stock Prices**
  - Although generally true, recent evidence suggests that, inconsistent with the efficient market hypothesis, stock prices do not instantaneously adjust to profit announcements.
  - Instead, on average stock prices continue to rise for some time after the announcement of unexpectedly high profits, and they continue to fall after surprisingly low profit announcements.



# Mini-Case: Ivan Boesky

- In the 1980s, Mr. Boesky made millions of dollars for himself and his investors by investing in take-over targets. Did he disprove the efficient market hypothesis by predicting who would be take-over targets in the coming months?



# Mini-Case: Ivan Boesky

- Hardly. In 1986, Mr. Boesky was charged with insider trading. This does show that you can make money on information others don't have...





# THE PRACTICING MANAGER: Implications for Investing

1. How valuable are published reports by investment advisors?
2. Should you be skeptical of hot tips?
3. Do stock prices always rise when there is good news?
4. Efficient Markets prescription for investor



# Implications for Investing

- How valuable are published reports by investment advisors?



# Implications for Investing

1. Should you be skeptical of hot tips?
  - YES. The EMH indicates that you should be skeptical of hot tips since, if the stock market is efficient, it has already priced the hot tip stock so that its expected return will equal the equilibrium return.
  - Thus, the hot tip is not particularly valuable and will not enable you to earn an abnormally high return.



# Implications for Investing

2. Should you be skeptical of hot tips?
  - As soon as the information hits the street, the unexploited profit opportunity it creates will be quickly eliminated.
  - The stock's price will already reflect the information, and you should expect to realize only the equilibrium return.



# Implications for Investing

3. Do stock prices always rise when there is good news?
- NO. In an efficient market, stock prices will respond to announcements only when the information being announced is new and unexpected.
  - So, if good news was expected (or as good as expected), there will be no stock price response.
  - And, if good news was unexpected (or not as good as expected), there will be a stock price response.



# Implications for Investing

- Efficient Markets prescription for investor
  - Investors should not try to outguess the market by constantly buying and selling securities. This process does nothing but incur commissions costs on each trade.



# Implications for Investing

- Efficient Markets prescription for investor
  - Instead, the investor should pursue a “buy and hold” strategy—purchase stocks and hold them for long periods of time. This will lead to the same returns, on average, but the investor’s net profits will be higher because fewer brokerage commissions will have to be paid.



# Implications for Investing

- Efficient Markets prescription for investor
  - It is frequently a sensible strategy for a small investor, whose costs of managing a portfolio may be high relative to its size, to buy into a mutual fund rather than individual stocks. Because the EMH indicates that no mutual fund can consistently outperform the market, an investor should not buy into one that has high management fees or that pays sales commissions to brokers but rather should purchase a no-load (commission-free) mutual fund that has low management fees.





## Case: Any Efficient Markets Lessons from Black Monday of 1987 and the Tech Crash of 2000?

- Does any version of Efficient Markets Hypothesis (EMH) hold in light of sudden or dramatic market declines?
- Strong version EMH?
- Weaker version EMH?
- A **bubble** is a situation in which the price of an asset differs from its fundamental market value?
- Can bubbles be rational?
- Role of **behavioral finance**



# Behavioral Finance

- Dissatisfaction with using the EMH to explain events like 1987's Black Monday gave rise to the new field of behavioral finance, in which concepts from psychology, sociology, and other social sciences are applied to understand the behavior of securities prices
- EMH suggests that “smart money” would engage in short sales to combat overpriced securities, yet short sale volume is low, leading to behavior theories about “loss aversion”
- Other behavior analysis points to investor overconfidence as perpetuating stock price bubbles



# Chapter Summary

- **The Efficient Market Hypothesis:** We examined the theory of how both old and new information are expected to be incorporated into current stock prices.
- **Evidence on the Efficient Market Hypothesis:** We looked at evidence for various tests of the hypothesis and how well the hypothesis holds.



# Chapter Summary

- Behavioral Finance: We also examined another important area of research to explain how stock prices are formed based on psychological factors affecting investors.