

R35 Market Efficiency

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1. Introduction

Market efficiency concerns the extent to which market prices incorporate available information. Investors are interested in market efficiency because if prices do not fully incorporate information, then opportunities exist to make abnormal profits. Governments and regulators are interested in market efficiency because market efficiency promotes economic growth.

2. The Concept of Market Efficiency

2.1 The Description of Efficient Markets

- An **informationally efficient market** is one in which asset prices reflect new information quickly and rationally.
- 'Quick' is relative to the time a trader takes to execute an order. If it takes 15 minutes for new information to be incorporated into security prices and trade execution time is 30 minutes, we can say the new information is incorporated quickly.
- Market prices should not react to information that is well anticipated; only unexpected information should move prices.
- In a perfectly efficient market investors should use a passive investment strategy because active investment strategies will underperform due to transaction costs and management fees.

2.2 Market Value versus Intrinsic Value

- **Market value** of an asset is its current price at which the asset can be bought or sold.
- **Intrinsic value** is the value that would be placed on an asset by investors if they had full knowledge of the asset's characteristics.
- In highly efficient markets, full information is available in the market and is reflected in asset prices. Therefore, market value = intrinsic value.
- However, if markets are not efficient, the two prices can diverge significantly.

3. Factors Affecting Market Efficiency Including Trading Costs

The following factors affect a market's efficiency:

- **Market Participants** – More participants increase efficiency.
- **Information availability and financial disclosure** – More information increases efficiency.
- **Limits to trading** – Limitations on arbitrage and short selling decrease efficiency.

Transaction Costs and Information-Acquisition Costs

Two types of costs are incurred by traders when trading on market inefficiencies: transaction costs and information-acquisition costs. These costs should be considered when evaluating a market's efficiency.

- **Transaction costs** – High costs decrease efficiency.

- **Information-acquisition costs** – High costs decrease efficiency.

4. Forms of Market Efficiency

The table below introduces three forms of market efficiency which are differentiated based on assumptions about the level of information in security prices.

Forms of Market Efficiency	Market Prices Reflect:		
	Past Market Data	Public Information	Private Information
Weak form	Yes	No	No
Semi-strong form	Yes	Yes	No
Strong form	Yes	Yes	Yes

Evidence that investors can consistently earn abnormal returns by trading on the basis of information would challenge the efficient market hypothesis.

4.1 Weak Form

In a weak-form efficient market:

- security prices fully reflect **all past market data**.
- non-market public and private information is not necessarily incorporated into the stock price.
- technical analysts cannot make abnormal returns on a consistent basis simply by analyzing historical market information.

Tests to check whether securities markets are weak-form efficient:

- Look at patterns of prices. Is there any serial correlation in security returns? If yes, the market is not weak-form efficient.
- Can trading rules or any technical analysis method involving historical data be used to make abnormal profits? If yes, then it contradicts weak-form efficiency.

4.2 Semi-strong Form

In a semi-strong-form efficient market:

- prices reflect **all publicly known and available information**. This includes financial data such as earnings and dividends, and trading data such as closing prices, volume, etc. Weak-form is a subset of semi-strong-form.
- prices adjust quickly and accurately to new public information.
- efforts to analyze publicly available information are futile.
- fundamental analysis will not lead to abnormal returns in the long run. Lots of fundamental analysts (active investors, portfolio managers) evaluating securities to buy/sell help the market in becoming semi-strong-form efficient.

Tests to check whether securities markets are semi-strong-form efficient:

- Researchers test for when markets are semi-strong-form efficient using event studies. Most research indicates that developed securities markets are semi-strong-form efficient while developing countries' markets may not be semi-strong-form efficient.

4.3 Strong Form

In a strong-form efficient market:

- prices reflect all **public and private information**. It encompasses semi-strong and weak form.
- investors will not be able to earn abnormal profits by trading on private information.

Tests to check whether securities markets are strong-form efficient:

- Researchers test whether a market is strong-form efficient by testing whether investors can earn abnormal profits by trading on non-public information.
- Most research indicates that markets are not strong-form efficient as regulations prohibit the use of private information (or insider trading).

5. Implications of the Efficient Market Hypothesis

We can draw the following implications of the efficient market hypothesis:

Form of Market Efficiency	Implication	Conclusion
Securities markets are weak-form efficient.	Investors cannot earn abnormal returns by trading on the basis of past trends in price.	Technical analysts assist markets in maintaining weak-form efficiency.
Securities markets are semi-strong-form efficient.	Analyst must consider whether the information is already reflected in security prices and how any new information affects a security's value.	Fundamental analysts assist markets in maintaining semi-strong-form efficiency.
Securities markets are NOT strong-form efficient.	Investors trading on private information can make abnormal profits.	Regulations try to prevent insider trading.

If markets are semi-strong form efficient, active portfolio managers cannot outperform the market on a consistent basis, therefore investors should invest passively.

The role of portfolio managers is not necessarily to beat the market, but to establish and manage portfolios consistent with their clients' objectives and constraints.

6. Market Pricing Anomalies – Time Series and Cross-Sectional

A market anomaly is something that challenges the idea of market efficiency. Some

anomalies observed in the market are:

6.1 Time-Series Anomalies

- Calendar anomalies: The returns in January are higher than in any other month, especially for small firms. This phenomenon is known as the January effect.
- Momentum and overreaction anomalies: Momentum effect refers to the findings that stocks that have experienced high-returns in the short term tend to continue to generate higher return in subsequent periods.

Overreaction effect is based on the idea that investors often overreact to events or release of unexpected public information. For example, it has been observed that stocks that have had poor returns in the past three-to-five years (losers) tend to outperform the market in subsequent periods.

6.2 Cross-Sectional Anomalies

- Size effect: Small-cap stocks tend to perform better than large-cap stocks.
- Value effect: Value stocks (stocks with lower P/E, P/B or high dividend yields) tend to perform better than growth stocks.

7. Other Anomalies, Implications of Market Pricing Anomalies

- Closed-end investment fund discounts: Closed-End investment funds sell at a discount to NAV.
- Earnings surprise: Investors can earn abnormal profits by buying stock of companies with positive earnings surprise and selling those with negative earnings surprise.
- IPOs: Prices rise on listing day, but underperform in the long term.
- Predictability of returns based on prior information: Research has found that equity returns are related to prior information such as interest rates, inflation rates, stock volatility, and dividend yields.

In practice, it is not easy to trade and benefit from anomalies. Most research concludes that anomalies are not violations of market efficiency, but are the result of statistical methods used to detect anomalies.

Many anomalies might simply be a result of **data mining**. At times researchers carefully analyze data and form a hypothesis. This is the opposite of what should happen. Ideally, a hypothesis should be formed and then the data should be analyzed to accept or reject the hypothesis.

8. Behavioral Finance

Behavioral finance uses human psychology to explain investment decisions. Some irrational behavior and biases observed in the market are:

- Loss aversion: Investors dislike losses more than they like gains of the same amount.
- Herding: In herding, investors ignore their private information and act as other

investors do.

- **Overconfidence:** Overconfident investors do not process information. They place too much confidence in their ability to process and analyze information and, thus, value a security.
- **Information cascades:** Information cascade is when people observe the actions of a handful of market participants and blindly follow their decisions. The informed participants act first and their decision influences the decisions of others.

Other behavioral Biases

- **Representativeness:** Investors with this bias will assess probabilities based on events seen before, or prior experiences, instead of calculating the outcomes.
- **Mental accounting:** Investors divide investments into separate mental accounts, they do not view them as a total portfolio.
- **Conservatism:** Investors tend to be slow to react to changes.
- **Narrow framing:** Investors focus on issues in isolation.

Behavioral Finance and Investors

Behavioral biases affect all investors irrespective of their experience. An understanding of behavioral finance will help individuals make better decisions, both individually and collectively.

Behavioral Finance and Efficient Markets

If investors must be rational for efficient markets, the existence of behavioral biases implies that the markets cannot be efficient. If the effects of the biases did not cancel each other out, then the markets could not be efficient. But, since investors are not making abnormal returns consistently, the markets can be considered efficient. Evidence supports market efficiency. In other words, markets can be considered efficient even if market participants exhibit seemingly irrational behavior.

Summary

LO.a: Describe market efficiency and related concepts, including their importance to investment practitioners.

In an informationally efficient market, asset prices reflect new information quickly and rationally. 'Quick' is relative to the time a trader takes to execute an order. In an efficient market, it is not possible to consistently achieve superior abnormal returns. Prices should only react to unexpected information. In an efficient market, passive investment strategy is preferred over active investment strategy.

LO.b: Contrast market value and intrinsic value.

Market value is the price at which an asset can be bought or sold. Intrinsic value is the value based on complete information. In highly efficient markets, complete information is available in the market which is incorporated in the stock price. Therefore, market value = intrinsic value.

LO.c: Explain factors that affect a market's efficiency.

- Market Participants
- Information availability and financial disclosure
- Limits to trading
- Transaction costs
- Information-acquisition costs

LO.d: Contrast weak-form, semi-strong-form, and strong-form market efficiency.

Forms of Market Efficiency	Past Market Data	Public Information	Private Information
Weak form	Yes	No	No
Semi-strong form	Yes	Yes	No
Strong form	Yes	Yes	Yes

LO.e: Explain the implication of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and passive portfolio management.

- If markets are weak-form efficient, then technical analysts cannot make abnormal returns on a consistent basis simply by analyzing historical market information.
- Fundamental analysis will not lead to abnormal returns in the long run if the market is semi-strong-form efficient.
- In a strong-form efficient market, investors will not be able to earn abnormal profits by trading on private information.

LO.f: Describe selected market anomalies.

Time Series anomalies:

- Calendar anomalies: The returns in January are higher than in any other month, especially for small firms. This phenomenon is known as the January effect.
- Momentum and overreaction anomalies: Investors overreact to events or release of unexpected public information.

Cross-sectional anomalies:

- Size effect: Small-cap stocks tend to perform better than large-cap stocks.
- Value effect: Value stocks tend to perform better than growth stocks.

Other anomalies:

- Closed-end fund discounts: Closed-End funds sell at a discount to NAV.
- Earnings surprise: Investors can earn abnormal profits by buying stock of companies with positive earnings surprise and selling those with negative earnings surprise.
- IPOs: Prices rise on listing day, but underperform in the long term.
- Predictability of returns based on prior information: Research has found that equity returns are related to prior information such as interest rates, inflation rates, stock volatility, and dividend yields.

LO.g Describe behavioral finance and its potential relevance to understanding market anomalies.

Behavioral finance examines if investors act rationally, how investor behavior affects financial markets, and how cognitive biases may result in anomalies.

Some of the observed irrational behaviors include:

- Loss aversion: Traditional finance assumes that investors are risk averse. Behavioral finance suggests that humans are loss averse.
- Herding: Herding is where one set of investors follows another set of investors for no rational reason.
- Overconfidence: The overconfidence bias explains pricing anomalies. Overconfident investors do not process information. They place too much confidence in their ability to process and analyze information and, thus, value a security.
- Information cascades: Information cascade is when people observe the actions of a handful of market participants (or experts) and follow their decisions.
- Representativeness: Investors with this bias will assess probabilities based on events seen before, or prior experiences (instead of calculating the outcomes).
- Mental accounting: Investors divide money into different buckets, they do not view their assets as a whole but allocate based on goals.
- Conservatism: Investors tend to be slow to react to changes.
- Narrow framing: Investors focus on issues in isolation.

Practice Questions

1. The market where any new information about a security is quickly, fully, and rationally reflected in the security's price, is *best* described as?
 - A. Allocational efficiency.
 - B. Operational efficiency.
 - C. Informational efficiency.
2. Individuals investing in an inefficient market, will *most likely* benefit from a(n):
 - A. passive investment strategy.
 - B. active or passive investment strategy.
 - C. active investment strategy.
3. Which of the following statements regarding a market's efficiency is *least likely* to be true?
 - A. The greater the number of market participants, the higher would be the efficiency.
 - B. The greater the restrictions on arbitrage trades, the higher would be the efficiency.
 - C. The lower the costs of trading and information gathering, the higher would be the efficiency.
4. Which of the following statements regarding different types of markets' efficiency is *least likely* to be true?
 - A. In weak-form of efficient markets, prices do not reflect all past price and volume information.
 - B. In semi-strong-form of efficient markets, prices fully reflect all available public information.
 - C. In strong-form of efficient markets, prices fully reflect all public and private information.
5. Bruce has a trading strategy that is based on buying undervalued securities using fundamental analysis to generate abnormal profits. If his trading strategy does make abnormal returns, the market is *most likely*:
 - A. Weak-form efficient.
 - B. Semi-strong-form efficient.
 - C. Strong-form efficient.
6. Which of the following statements regarding market anomalies is the *most accurate*?
 - A. Neither weak-form nor semi-strong-form market efficiency holds.
 - B. Discovered anomalies are not violations of market efficiency, but a limitation of the research methodology.
 - C. Weak-form market efficiency holds but semi-strong-form doesn't hold.

7. The behavioral finance theory which explains how investors place greater importance on the recent outcomes is *most accurately* described as:
 - A. gambler's fallacy.
 - B. representativeness.
 - C. narrow framing.

8. The behavioral bias under which an investor focuses on issues in isolation is *most likely* known as:
 - A. Mental accounting.
 - B. Narrow framing.
 - C. Representativeness.

Solutions

1. C is correct. In an informationally efficient market, all the available information about any security is immediately and rationally reflected in its price. In an efficient market, prices should be expected to react only to the “unexpected” or “surprise” element of information releases. Investors process the unexpected information and revise expectations accordingly.
2. C is correct. In an inefficient market, individuals might be able to earn abnormal profits as securities might be mispriced. On the other hand, in an efficient market a passive investment strategy would be preferred to an active strategy as there are fewer opportunities to earn abnormal profits.
3. B is correct. The greater the restrictions on arbitrage trading, the lower will be the efficiency. This is because arbitrageurs trade on the price differences between the same security or similar securities trading at different locations. Their trading minimizes the price differences across exchanges, making the markets more efficient.
4. A is correct. In weak-form of efficient markets, prices fully reflect all past price and volume information.
5. A is correct. In weak-form of efficient markets, prices fully reflect all past price and volume information. Hence, technical analysis does not result in abnormal profits in this market. In semi-strong-form of efficient markets, prices fully reflect all available public information. Hence, fundamental analysis does not result in abnormal profits in this market. In strong-form of efficient markets, prices fully reflect all public and private information. Hence, even trading on insider information does not result in abnormal profits in this market and the best choice is a passive investment strategy. Since Bruce earns abnormal profits using fundamental analysis, the markets are weak-form efficient.
6. B is correct. Discovered anomalies are not violations of market efficiency, but a limitation of the research methodology like inadequately adjusting for risk or data mining.
7. A is correct. Gambler’s fallacy is the behavioral finance theory in which recent outcomes affect investors’ estimates of future probabilities. Narrow framing involves investors focusing on issues in isolation. Representativeness involves investors assessing probabilities of outcomes depending on how similar they are to the current state.
8. B is correct. Narrow framing is where investors focus on issues in isolation. Representativeness is where investors assess new information and probabilities of outcomes based on similarity to the current state or to a familiar classification. In mental

accounting, investors divide money into different buckets, they do not view their assets as a whole but allocate based on goals.