

LM03 · EQUITY INVESTMENTS · LOS A–G

Market Efficiency

CFA Level I · 2025 Curriculum

Core Definition

Market efficiency is **the extent to which market prices incorporate available information**. In an informationally efficient market, asset prices reflect new information *quickly and rationally*, and market prices incorporate all past and present information.

Key insight: Only the *unanticipated element* of new information should move prices. Information that is well anticipated is already priced in.

Why It Matters

- **Price efficiency ("informative prices"):** The price signal determines where capital should be allocated to earn the highest risk-adjusted return — avoiding malinvestment and promoting sound economic growth.
- **Information efficiency** assumes information is timely, complete, correct, and understandable.
- **Consequence:** In an efficient market, consistent, superior, risk-adjusted returns are not achievable. Passive returns > active returns (because of lower costs).
- **Inefficiency is what justifies active management.**

Learning Outcomes Covered

- a Describe market efficiency and related concepts, including their importance to investment practitioners
- b Contrast market value and intrinsic value
- c Explain factors that affect a market's efficiency
- d Contrast weak-form, semi-strong-form, and strong-form market efficiency
- e Explain the implications of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and passive portfolio management
- f Describe market anomalies
- g Describe behavioral finance and its potential relevance to understanding market anomalies

Exam Tip: In a *perfectly efficient* market, investors should use a passive investment strategy because active strategies will underperform by the amount of transaction costs and management fees. Active management only pays off to the extent markets are *inefficient*.

LOS B · MARKET VALUE VS. INTRINSIC VALUE

Market Value vs. Intrinsic Value

Market Value (MV)

The **current price** at which an asset can be bought or sold (i.e., the bid-ask price in the market).

Intrinsic Value (IV)

Also called **fundamental value** — the price of an asset if *complete information and understanding* were used. Typically estimated as the **present value of future cash flows**.

Requires judgment — IV is just an estimate.

The Three Valuation Relationships

RELATIONSHIP	INTERPRETATION	ACTION
$IV < MV$	Overvalued	Sell / underweight
$IV \approx MV$	Fairly valued	Hold / equal weight
$IV > MV$	Undervalued	Buy / overweight

Link to Market Efficiency

In **highly efficient markets**, full information is available and is reflected in asset prices. Therefore **market value $\approx$ intrinsic value**.

If markets are **not efficient**, the two prices can diverge significantly — creating opportunities (or traps) for active managers.

Curriculum Question — Worked Through

An analyst estimates that a security's intrinsic value is lower than its market value. The security appears to be:

- A. undervalued
- B. fairly valued
- **C. overvalued ✓**

$IV < MV$ means market price exceeds what the asset is worth — the security is overvalued.

Exam Tip: A market in which an asset's market values are, on average, equal to or nearly equal to intrinsic value is attractive for **passive investment** — active management cannot add enough value to overcome transaction and management costs.

LOS A · WHAT EFFICIENCY MEANS

Defining an Informationally Efficient Market

An **informationally efficient capital market** is one in which the *current price of a security fully and quickly reflects all available information about that security without bias.*

Three Related Efficiency Concepts

Price efficiency

Prices act as a signal that determines where capital should be allocated to earn the highest risk-adjusted return.

Informational efficiency

Information is timely, complete, correct, and understandable — and prices reflect it quickly.

Operational efficiency

Low transaction costs allow prices to adjust rapidly to new information.

Key Implications of an Efficient Market

- 1 **Prices should not react to anticipated information** — only unexpected information moves prices.
- 2 **Consistent superior risk-adjusted returns are not achievable.**
- 3 **Passive R > Active R** (passive outperforms active after costs) because active strategies underperform by the amount of transaction costs and management fees.
- 4 **Inefficiency is what justifies active management** — to the extent prices are inefficient, active strategies can generate positive risk-adjusted returns.

Curriculum Example — A Defaulting Bond Issuer

A speculative-grade bond issuer announces — just before bond markets open — that it will default on an upcoming interest payment. In the days leading up to the announcement, the financial media had already reported that:

- Suppliers were making deliveries only for cash payment, reducing liquidity
- Financial condition had likely deteriorated to the point of lacking cash for the interest payment
- Public capital markets were closed to the company, but it was negotiating a private bank loan

If the market is highly efficient, the bond's price most likely fully reflects the post-default value *in the period leading up to the announcement* — all three pieces of news were already public. The

only remaining **unanticipated element** in the announcement was that the issuer had *failed in its negotiations for a bank loan*.

Exam Tip: Efficiency is about **speed and completeness of information incorporation**, not about prices being "right" in some absolute sense. An efficient market can still be volatile; what it rules out is systematic, exploitable mispricing.

LOS C · FACTORS AFFECTING EFFICIENCY

Factors That Affect a Market's Efficiency

Markets are not all equally efficient. Five main factors push a market toward *greater* or *lesser* efficiency.

EFFICIENCY SPECTRUM — INEFFICIENT VS. EFFICIENT MARKET CONDITIONS

	← LESS EFFICIENT	MORE EFFICIENT →
Market Participants	Fewer	More, numerous
Information Availability	Narrower	Wider
Financial Disclosure	Less, variable	More, standardized
Limits to Trading	Restrictions, slow	Speedy, transparent
Transaction Costs	High	Low
Information Costs	High	Low
Summary: more participants + more information + fewer frictions = more efficient		

The Five Factors — Detail

FACTOR	DIRECTION	WHY
Market participants	More participants → more efficient	Larger numbers of active investors increase competition and speed of price adjustment.
Information availability & financial disclosure	More/standardized info → more efficient	Wider availability and more standardized disclosure let prices reflect information more completely.
Limits to trading	Fewer impediments → more efficient	Restrictions on arbitrage and short selling decrease efficiency. Short selling in particular helps arbitrageurs push overpriced securities back down toward intrinsic value.
Transaction costs	Lower costs → more efficient	High costs keep mispricing within the "bounds of arbitrage" — a mispricing can persist if it is not large enough to cover trading costs.

Information-acquisition costs

Lower costs → more efficient

Expensive research is a friction that can keep prices from fully reflecting information.

Two Views on Information Costs**Classic view:**

Return = risk assumed. Information costs are a "waste of time" — nothing can be earned from them in an efficient market.

Modern view:

(Return – information costs) = risk assumed. Information gathering is a legitimate expense that must be recovered in the return.

Exam Tip: "Bounds of arbitrage" — a market can still be considered efficient even if small mispricings exist, as long as those mispricings are too small to profit from after transaction and information costs.

QUIZ 1 · CHECKPOINT**Test Your Understanding: Foundations**

Q1. An informationally efficient capital market is *best* described as one in which:

Q2. An analyst estimates that a stock's intrinsic value is 72. *The stock currently trades at 80.* The stock appears to be:

Q3. Which of the following factors is *least likely* to increase a market's efficiency?

Q4. A speculative-grade issuer announces a default on an upcoming interest payment. In the period leading up to the announcement, all the key elements of its financial difficulty had already been reported in the financial media. If the market is highly efficient, the bond's market price most likely fully reflects the post-default value:

LOS D · FORMS OF THE EMH (EUGENE FAMA, 1970)

The Three Forms of Market Efficiency

The Efficient Markets Hypothesis (EMH), formalized by **Eugene Fama in 1970**, distinguishes three forms of efficiency based on which information set prices reflect.

Efficiency Taxonomy

FORMS OF MARKET EFFICIENCY	PAST MARKET DATA	PUBLIC INFORMATION	PRIVATE INFORMATION
Weak-form	✓	—	—
Semi-strong-form	✓	✓	—
Strong-form	✓	✓	✓

Each stronger form encompasses the weaker forms.

The Three Forms — Detail

1. Weak Form

Future returns should be independent of past returns or patterns — *no serial correlations, no trading rules.*

Proponents assert that abnormal risk-adjusted returns cannot be earned by using **trading rules and technical analysis** based on historical security-market data.

2. Semi-Strong Form

Encompasses weak form.
Security prices rapidly adjust to reflect *all public information*.

Investors cannot earn abnormal risk-adjusted returns if their decisions are based on important material information *after it has been made public*. **Considerable research support in developed markets.**

3. Strong Form

Encompasses both weak and semi-strong forms. Assumes *perfect markets* where information is cost-free and available to all.

Under strong-form EMH, no one — **not even company insiders** — can consistently achieve abnormal risk-adjusted returns. *Research rejects the strong-form hypothesis (i.e., fails to accept).*

What Each Form Rules Out

FORM HOLDS →	TECHNICAL ANALYSIS	FUNDAMENTAL ANALYSIS	INSIDER INFORMATION
Weak	Does not work	Can still work	Can still work

Semi-strong	Does not work	Does not work	Can still work
Strong	Does not work	Does not work	Does not work

Exam Tip: Evidence suggests most **developed markets are semi-strong form efficient**. The strong form is *rejected* by research — insiders can and do generate abnormal returns when trading on material non-public information.

LOS E · IMPLICATIONS FOR INVESTORS & ANALYSTS

Implications for Active vs. Passive Management

What Each Form Implies for Analysis and Portfolio Management

- 1 **If markets are weak-form efficient:** *technical analysis* will not produce consistent abnormal risk-adjusted returns.
- 2 **If markets are semi-strong-form efficient:** neither technical nor fundamental analysis will generate abnormal profits consistently. Analysts must consider *what is already priced in* and how new information will affect prices — *fundamental analysis facilitates semi-strong EMH*.
- 3 **If markets are strong-form efficient:** even *inside information* will not generate abnormal profits. Research rejects this form.
- 4 **Combined (weak + semi-strong):** individual stock selection is not profitable — hold a diversified (index/benchmark) portfolio. Active managers are largely "*a waste of money*" for investors (The Loser's Game).

Active vs. Passive — The Core Trade-off

Passive Management

- Buy and hold a broad market index
- Lower management fees
- Lower transaction costs
- Wins in efficient markets

Active Management

- Attempt to earn positive risk-adjusted returns
- Higher fees and trading costs
- Only justified when markets are *inefficient*
- Must overcome costs to add value

Role of the Portfolio Manager in an Efficient Market

Even in efficient markets, portfolio managers still have essential roles:

- Establish portfolio risk/return objectives
- Implement portfolio diversification
- Implement asset allocation based on risk/return objectives
- Tax minimization

Role of Analysts (Paradox)

In a semi-strong-efficient market, *fundamental analysis is what keeps prices efficient*. Analysts must still work to figure out what is priced in and how new information will affect prices — but collectively,

competition among analysts makes it unlikely any single analyst earns abnormal risk-adjusted returns consistently.

Exam Tip: In a *perfectly* efficient market, investors should prefer passive investing because active strategies underperform by the amount of transaction costs and management fees. But since no real market is perfectly efficient, there remains some — limited — scope for skilled active management.

QUIZ 2 · CHECKPOINT

Test Your Understanding: Forms & Implications

Q5. If markets are *semi-strong-form* efficient, which of the following is *most likely* true?

Q6. Research evidence *most likely* supports which characterization of developed equity markets?

Q7. A portfolio manager claims she can generate consistent abnormal returns by trading on past price and volume patterns alone. If markets are at least *weak-form efficient*, her strategy will *most likely*:

Q8. Even in a semi-strong-efficient market, the portfolio manager's role includes all of the following *except*:

LOS F · MARKET ANOMALIES

Market Anomalies

A **market anomaly** is something that challenges the idea of market efficiency — a finding that would lead us to reject the hypothesis of market efficiency. The curriculum groups anomalies into three categories.

① Time-Series Anomalies

Calendar Anomalies

- **January effect** — higher returns in equity markets in January than in other months (especially for small firms). Also called the *turn-of-the-year effect*; concentrated in the first five days of January.
- **Turn-of-the-month effect** — higher returns on the last trading day of the month and the first three trading days of the next month.
- **Day-of-week effect** — average Monday returns are less than zero and lower than the other four weekdays.
- **Holiday effect** — the day prior to a holiday tends to have higher returns.

These calendar effects all lack persistence.

Overreaction Anomalies

Investors *overreact* to the release of unexpected new information — **good news inflates prices, bad news depresses prices** beyond what the news justifies. This supports the use of a *contrarian strategy*: firms with poor stock returns over the previous three to five years ("losers") have better subsequent returns than firms that had high stock returns over the prior period.

Momentum Anomalies

Securities that have *outperformed in the short-run continue to outperform*. High short-term returns are followed by continued high returns.

② Cross-Sectional Anomalies

Size effect

Small-cap equities tend to outperform large-cap equities on a risk-adjusted basis. *Not confirmed over time* — later studies suggest investors may have traded on and eliminated the anomaly, or the initial finding was a random result for the time period examined.

Value effect

Value stocks (*low P/E, low market-to-book, high dividend yield*) outperform growth stocks over time. Use of a 3-factor model (market, size, value) instead of the CAPM (1-factor) *eliminates this anomaly* — suggesting the value effect may be a reward for additional risk factors rather than a true inefficiency.

③ Other Anomalies

- **Closed-end fund discounts** — closed-end funds frequently sell at a discount to their net asset value per share (NAVPS); typically not worth the transaction costs to exploit.
- **Earnings surprises** — prices may be slow to adjust to earnings announcements. Buying stocks with positive surprises and selling those with negative surprises appears to generate abnormal returns.
- **IPOs** — prices typically rise on listing day (IPO underpricing / first-day pop) but *underperform in the long term*. Anomaly is exploitable only if you can get shares at the offer price.
- **Predictability of returns based on prior information** — equity returns are related to prior information such as interest rates, inflation rates, stock volatility, and dividend yields (often economic-cycle related).

Why Anomalies May Not Be Profitable

- May be a reward for other risk factors not captured in the model
- Transaction costs may exceed the small size of the profit opportunity
- Trading restrictions may prevent exploitation
- Lack of theoretical explanation
- May not persist in subsequent periods once they are known and exploited

Most research concludes that anomalies are **not violations of market efficiency** but rather the result of the statistical methods used to detect them. Portfolio management based on previously identified anomalies will likely be unprofitable.

Exam Tip: For the exam, know the **three categories** (time-series, cross-sectional, other) and remember the curriculum's conclusion: most anomalies are not true inefficiencies — and even those that are real are often not profitable after costs.

LOS G · BEHAVIORAL FINANCE

Behavioral Finance & Investor Biases

Behavioral finance examines investor behavior (*observed*), its effect on financial markets, how cognitive biases may result in anomalies, and whether investors are rational — rather than relying on normative assumptions (i.e., rationality).

Core insight: Investors do not always make efficient (rational and optimal) decisions due to cognitive and behavioral biases.

Investor Biases from the Source Material

Loss Aversion

Tendency to prefer avoiding losses to acquiring gains — investor preferences are *asymmetrical*. Investors dislike losses more than they like gains of equal amount. Can lead to *loss persistence* — the unwillingness to actually realize a loss. (Loss aversion is distinct from risk aversion: a loss-averse investor can even take on extra risk to avoid realizing a loss.)

Herding

Investors *ignore their own analysis* and make decisions in line with the direction of the market. Can sometimes be rational (correlated strategies, clustered trading — "whale watching"). Herding can result in investors taking the same side of the market over time.

Information Cascades

The transfer of information from those who are first to act upon it, whose decisions influence others. Uninformed investors mimic the actions of informed investors — results in *serial correlations* and perhaps *overreactions* to information.

Overconfidence

Investors have an *inflated view of their ability* to process information and value securities. Securities will be mispriced if investors overestimate their ability to value them. However, this mispricing may be hard to predict, may only be temporary, may not be exploitable for abnormal profits, and may only exist for high-growth firms.

Representativeness

Investors assess probabilities based on events seen before or prior experiences instead of calculating the outcomes. They assume *good companies or good markets are good investments*.

Gambler's Fallacy

Recent outcomes affect investors' estimates of future probabilities — e.g., expecting a reversal after a run of similar results.

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* rather than considering the full context.

Implications of Behavioral Biases**For the market (unclear):**

Even if some investors exhibit bias, as long as enough do *not*, markets will remain efficient. A market can still be considered efficient even if participants act irrationally, as long as they cannot consistently beat the market on a risk-adjusted basis.

For the individual investor:

Know thyself. If you are subject to certain biases, develop rules to avoid the trap — e.g., position limits, loss limits, excessive gain/loss timeouts.

Exam Tip: Although behavioral finance can help *explain* some market anomalies, a market can still be considered efficient even if participants act irrationally — as long as they cannot consistently beat the market on a risk-adjusted basis. Bias does not necessarily imply exploitable inefficiency.

QUIZ 3 · CHECKPOINT

Test Your Understanding: Anomalies & Behavioral Finance

Q9. Higher equity returns in January (especially for small firms) relative to other months is an example of a:

Q10. The curriculum notes that the *value effect* — outperformance of value stocks over growth stocks — largely disappears when researchers use a:

Q11. An investor sells her winning stocks quickly to "lock in gains" but refuses to sell her losing stocks because she doesn't want to realize the loss. This behavior is *best* described as:

Q12. An uninformed investor observes that several large institutional investors are buying a stock and buys it himself without doing his own research. This is *most consistent* with:

Q13. Which statement *best* captures the relationship between behavioral biases and market efficiency, as described in the source material?

MODULE COMPLETE

Your Scorecard

0 / 13

LM03 Key Takeaways — Exam-Ready Cheat Sheet

Core Concepts

- 1 **Informationally efficient market** = asset prices reflect new information quickly and rationally. Only the *unanticipated element* moves prices.
- 2 **Market Value** = current bid-ask price. **Intrinsic Value** = PV of future cash flows with complete information. $IV < MV \rightarrow$ overvalued (sell); $IV \approx MV \rightarrow$ fairly valued (hold); $IV > MV \rightarrow$ undervalued (buy).
- 3 **In efficient markets:** $MV \approx IV$, consistent superior risk-adjusted returns are not achievable, passive > active after costs.

Factors Affecting Efficiency

- 4 **More efficient:** more participants · wider/standardized information · lower transaction costs · lower information-acquisition costs · fewer limits to trading (including short-sale restrictions).
- 5 **Bounds of arbitrage:** small mispricings can persist if too small to profit from after transaction and info costs.

Three Forms of EMH (Fama, 1970)

- 6 **Weak:** prices reflect past market data $\rightarrow$ *technical analysis fails*.
- 7 **Semi-strong:** prices reflect all public information $\rightarrow$ *technical and fundamental analysis fail*. Developed markets generally support this form.

- 8 **Strong:** prices reflect all public + private information → *even insiders fail*. Research *rejects* the strong form.

Implications

- 9 **In a perfectly efficient market, prefer passive investing** — active strategies underperform by transaction costs + management fees. Portfolio managers still add value through risk objectives, diversification, asset allocation, and tax minimization.

Anomalies & Behavioral Finance

- 10 **Time-series anomalies:** calendar effects (January, turn-of-month, day-of-week, holiday), overreaction, momentum.
- 11 **Cross-sectional anomalies:** size effect (small-cap outperform), value effect (value > growth; disappears with 3-factor model).
- 12 **Other anomalies:** closed-end fund discounts, earnings surprises, IPOs, predictability based on prior info.
- 13 **Behavioral biases:** loss aversion, herding, information cascades, overconfidence, representativeness, gambler's fallacy, mental accounting, conservatism, narrow framing.
- 14 **Bottom line:** Most anomalies are not true violations of efficiency — they may be statistical artifacts, risk factors, or unprofitable after costs. A market can be efficient even if some investors act irrationally, as long as they cannot consistently beat it on a risk-adjusted basis.

Last-Minute Exam Checklist

Weak form fails: technical analysis

Semi-strong form fails: technical + fundamental analysis

Strong form fails: everything including insider info (rejected by research)

Efficiency increases with: more participants, more info, lower costs, fewer trading limits

Efficiency decreases with: short-sale restrictions, high costs, narrow info

Value anomaly — eliminated by 3-factor model

Strong-form EMH — rejected by research (insiders *can* earn abnormal returns)

Passive > **active** in efficient markets due to lower costs

Step 1 of 12