Learning Module 3: Market Efficiency

LOS 3a: describe market efficiency and related concepts, including their importance to investment practitioners

Market efficiency describes the extent to which available information is quickly reflected in the market price. Market efficiency is highly important to active investment managers as their advantage depends on exploiting market inefficiencies and earning excess risk-adjusted returns.

Investment officers must seriously consider the efficiency of any market they invest in to determine how much to invest in active management over passive management. If a market is completely efficient, passive management is often the better choice due to lower costs, but active management tends to be the better choice in highly inefficient markets.

Governments and market regulators are also concerned with market efficiency because an efficient market implies fair prices and optimal allocation of resources. In contrast, inefficient markets may ultimately lead to irrational resource allocation and below-average returns for unsophisticated investors.

Question

Net of fees in efficient markets, passive management is likely to perform:

A. Worse than active management.
B. Better than active management.
C. The same as active management.

Solution

The correct answer is **B**.

The gross performance of active and passively managed funds, in the long run, should be roughly equal. Since actively managed funds, on average, charge higher fees for investing in a given asset class, the net performance of passive management in a perfectly efficient market is likely to be better than active management.

LOS 3b: distinguish between market value and intrinsic value

The **market value** is the price at which an asset can currently be bought or sold. The **intrinsic value/fundamental value** is the value placed on it by investors if they had a complete understanding of the asset's investment characteristics.

In an efficient market, market values should be an accurate reflection of perceived intrinsic value. However, in relatively inefficient markets, significant discrepancies may exist between market and intrinsic value to the point that investors in these markets may attempt to calculate independent estimates of intrinsic value to test if assets are being undervalued or overvalued.

Question

If you believe the per-share intrinsic value of Ford Motor Company (F) is $14.00 and it is currently selling at a market price of $12.75, you think the stock is:

A. Overvalued.
B. Fairly valued.
C. Undervalued.

Solution

The correct answer is **C**.

Due to your belief that Ford stock is worth $1.25/share more than it is currently selling for, you believe that the stock is being undervalued by the market.

LOS 3c: explain factors that affect a market’s efficiency

Most, if not all, markets can be thought of as existing on a spectrum between perfect efficiency and complete inefficiency. This is because several factors contribute to or impede the efficiency of a market, including market participants, information availability and financial disclosure, and limits to trading.

Market Participants

In general, as the number and sophistication of participants within a market increase, the market becomes more efficient.

Information Availability and Financial Disclosure

The more information market participants have, the more accurate the market’s estimates of intrinsic value, thus creating greater market efficiency. In highly efficient markets, information is provided to all market participants simultaneously, and the advantage of insiders is limited.

Limits to Trading

The act of arbitrage is believed to increase market efficiency. Pure arbitrage typically involves buying an asset in one market and selling the same asset in a different market at a higher price. For example, when market participants believe a security is overvalued, they can perform a short sale – or the sale of a borrowed security. Some regulators argue that short selling puts inefficient downward pressure on securities leading to market crashes, but research generally shows that short selling helps supply and demand effectively determine market prices.

Transaction Costs and Information Acquisition Costs

Traders incur these expenses in order to locate and take advantage of potential market inefficiencies.

Transaction costs are the charges and fees incurred when purchasing or disposing of a security. Brokerage commissions, bid-ask spreads, taxes, and any other expenses incurred during trade execution are examples of these costs.

Information-acquisition costs are the charges incurred in order to gather pertinent data regarding a security or investment. Research charges, data subscription fees, financial analysis tools, and other resources used to collect and process data can all be included in these costs.

Question

As more market participants opt for passive management over active management, market efficiency is likely to:

A. Increase.
B. Decrease.
C. Remain unchanged.

Solution

The correct answer is **B**.

Passive management does not generally try to exploit market inefficiency but instead assumes that the market is highly efficient and passive investors will ultimately earn higher returns by reducing management fees as much as possible. At least, in theory, the popularity of active over passive management has an inverse relationship to its effectiveness. Therefore, as passive management becomes more common, there are fewer active market participants to find and profit from price inefficiencies, and market efficiency is likely to decrease.

LOS 3d: contrast weak-form, semi-strong-form, and strong-form market efficiency

Eugene Fama developed a framework of market efficiency that laid out three forms of efficiency: weak, semi-strong, and strong. Each form is defined with respect to the available information that is reflected in prices. Investors trading on available information that is not priced into the market would earn abnormal returns, defined as excess risk-adjusted returns.

Weak Form

In the weak-form efficient market hypothesis, all historical prices of securities have already been reflected in the market prices of securities. In other words, technicians – those trading on analysis of historical trading information – should earn no abnormal returns. Research has shown that this is likely the case in developed markets, but less developed markets may still offer the opportunity to profit from technical analysis.

Semi-strong Form

In a semi-strong-form efficient market, prices reflect all publicly known and available information, including all historical price information. Under this assumption, analyzing any public financial disclosures made by a company to determine a stock's intrinsic value would be futile since every detail would be taken into account in the stock's market price. Similarly, an investor could not earn consistent abnormal returns by acting on surprise announcements since the market would quickly react to the new information.

Strong Form

In a strong-form efficient market, security prices fully reflect both public and private information. Therefore, insiders could not generate abnormal returns by trading on private information because it would already figure into market prices. However, researchers find that

markets are generally not strong-form efficient as abnormal profits can be earned when nonpublic information is used.

Summary

In the following graph, we can clearly see that the weak form of market efficiency reflects only past market data. In contrast, the strong form reflects all past data, public market information, and insider information.

Market Prices Reflect

Forms of market efficiency	Past market data	Public information	Private information
Weak form	✓		
Semi-strong form	✓	✓	
Strong form	✓	✓	✓

Question

If a skilled fundamental financial analyst and an insider trader all earn the same long-run risk-adjusted returns, what form of market efficiency is likely to apply?

A. Weak form.
B. Strong form.
C. Semi-strong form.

Solution

The correct answer is **B**.

Since the insider trader can’t even earn higher risk-adjusted returns than the skilled fundamental financial analyst, the market must be strong-form efficient.

LOS 3e: explain the implications of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and passive portfolio management

The table below shows if abnormal returns can be earned through various strategies and active management assuming different types of market efficiency.

	Technical Analysis	Fundamental Analysis	Insider Trading	Active Management
Weak	No	Yes	Yes	Yes
Semi-strong	No	No	Yes	No
Strong	No	No	No	No

Since abnormal returns from the analysis of historical prices would be quickly arbitraged away in a weak-form efficient market, no technical analyst would be able to earn consistent abnormal returns. However, fundamental analysis and insider trading can still earn abnormal returns in a weak-form efficient market because public information and non-public information would not necessarily be fully reflected in market prices. Similarly, active management that utilizes fundamental analysis could also be capable of earning abnormal returns. Therefore, active management could consistently outperform passive management on a risk-adjusted basis – gross of fees – in a weak-form efficient market. In addition, if abnormal returns earned by active fundamental analysis exceed additional active management fees, active management could also earn abnormal returns net of fees.

Fundamental analysis and active management lose their abilities to earn abnormal returns in a semi-strong efficient market due to prices fully reflecting public information. Despite active management's inability to outperform passive management at the same risk level, active management may still be a rational investment option as a way for investors to manage certain risks and achieve financial goals. In strong-form efficient markets, even insider trading cannot earn abnormal profits. However, most markets are not strong-form efficient due to regulations against trading on non-public information.

Question

Which of the following statements is most likely true?

A. In a strong form efficient market, a rational investor would invest in an actively managed fund.
B. In a weak-form efficient market, active management can outperform passive management net of fees.
C. In a semi-strong form efficient market, fundamental analysis can earn abnormal returns, but technical analysis cannot.

Solution

The correct answer is **B**.

Active management should be able to outperform passive management gross of fees in a weak-form efficient market. However, its ability to outperform net of fees depends on how high abnormal returns are relative to additional management fees.

A is incorrect. In a strong form efficient market, no rational investor would invest in an actively managed fund since the fund would charge more fees, and pay more transactions costs, without being able to earn abnormal returns.

C is incorrect. Both fundamental analysis and technical analysis cannot earn abnormal returns in a semi-strong efficient market.

LOS 3f: describe market anomalies

Market anomalies are exceptions to the notion of market efficiency. They may be present if a change in the price of an asset or security cannot directly be linked to current relevant information known in the market. Market anomalies are only valid if they are consistent over long periods of time and not the result of data mining or examining data with the intent of developing a hypothesis. There is much debate if market anomalies truly exist after making appropriate adjustments for risk, transaction costs, sampling errors, and other factors. Market anomalies can be categorized as time-series anomalies, cross-sectional anomalies, or other anomalies.

Time Series Anomalies

- **Calendar anomalies:** Significant differences in returns on different days, months, or years. The most commonly known calendar anomaly is the January effect, in which stocks tend to outperform in the month of January. Part of this effect may be explainable by individual investors or fund managers selling off during the previous December either for tax reasons or to show off impressive end-of-year results.
- **Momentum/overreaction**: The momentum anomaly refers to the empirically observed tendency for rising asset prices to rise further and falling prices to keep falling. Stocks with strong past performance continue to outperform stocks with poor past performance in the next period. It is termed an anomaly because in finance theory, an increase in asset price, in and of itself, should not warrant a further increase in asset price unless it is backed up by new information or changes in demand and supply. The momentum anomaly suggests investors should buy past "winners" while selling past "losers." Financial economics students have largely attributed the appearance of momentum to cognitive biases, which belong in the realm of behavioral economics.

  The overreaction anomaly goes contrary to the momentum anomaly. It refers to the empirically observed tendency of stocks to exhibit long-term reversals in returns. Stocks that have performed poorly in the past three to five years demonstrate superior

performance over the next three to five years compared to stocks that have performed well in the past. The overreaction anomaly suggests buying past losers while selling past winners.

Cross-Sectional Anomalies

Two of the most researched of these anomalies in financial markets are the size effect and value effect. The Fama and French three-factor model (seen in the Portfolio Management section) attempts to adjust for these anomalies.

- **Size effect:** Small companies tend to outperform larger companies. This argument has indeed been validated through historical analysis, at least until the 1980s. However, some empirical studies have declared the size effect to be “dead” after the early 1980s.
- **Value effect:** Value stocks, which generally are stocks with below-average price-to-earnings and market-to-book ratios, and above-average dividend yields, have consistently outperformed growth stocks. However, this effect seems to have weakened or disappeared after the papers that highlighted it was originally published.

Other Anomalies

- **Closed-end fund discounts:** Closed-end funds sometimes sell at a discount to their net asset value or the price that the fund’s holdings could theoretically be sold for if fully liquidated. Tax inefficiency and expectations of manager underperformance may partially explain this anomaly.
- **Earnings surprise:** Stock prices have a tendency to underreact to new information, allowing for a momentum strategy (buying stocks with recent positive developments and selling stocks with recent negative developments) to be potentially profitable.
- **Initial public offerings (IPOs):** Investors can purchase a stock at its initial offering price to earn excess returns. This is somewhat understandable as investment banks

arranging the IPOs are often incentivized to set a low price.

- **Prior information:** Some researchers have found that equity returns relate to prior information like interest rates, inflation rates, stock volatility, and dividend yields. However, this is not evidence of a market anomaly as abnormal returns cannot be earned using such information.

Question

What characteristic used for stock screening is the *least likely* to result in any abnormal profits due to market anomalies?

A. P/E ratio.
B. Earnings per share.
C. Market capitalization.

The correct answer is **B**.

Screening for stocks with larger market capitalizations and P/E ratios may arguably allow the investor to take advantage of abnormal returns based on cross-sectional anomalies. However, stocks with low/high earnings per share alone (without considering price per share) have not been shown to generate abnormal returns.

LOS 3g: describe behavioral finance and its potential relevance to understanding market anomalies

Behavioral finance examines investor behavior to understand how people make decisions, individually and collectively. Behavioral finance does not assume that investors always act rationally but instead that people can be negatively affected by behavioral biases.

Market efficiency does not require all market participants to act rationally as long as the market acts rationally in aggregate. If the market can adjust for irrationality quickly, then behavioral finance does not necessarily contradict market efficiency. However, if the market allows its participants to earn abnormal returns from the irrationality of others, then the market cannot be efficient.

Loss Aversion Bias

People tend to dislike losses more than they like comparable gains. This may help to explain under-reaction and overreaction market anomalies.

Herding Bias

Market participants tend to trade along with other investors while potentially ignoring their own private information or analysis. This bias may also serve as a possible explanation for the under-reaction and overreaction market anomalies.

Information Cascades

Similar to herding, information cascade is the transmission of information from those who act first and whose decisions influence the decisions of others. As investors base their decisions on the actions of other investors acting before them, stock returns may be serially correlated and lead to over-reaction anomalies. In addition, research has shown information cascades to be

greater for companies with poor-quality information.

Overconfidence Bias

People tend to overestimate their ability to determine intrinsic values accurately and may not process information appropriately as a result, which ultimately leads to mispriced securities. This mispricing has been shown to mainly take place in higher-growth companies, whose prices react slowly to new information.

Other Biases

Other biases include representativeness (overweighting current situation in making decisions), mental accounting (separately accounting for different investments and individual security gains/losses), conservatism (maintaining prior views or forecasts despite new information), and narrow framing (viewing issues in isolation and responding based on how issues are posed).

Question

A scientist runs a series of unweighted coin-flipping experiments with Bob, Bill, and Jane as test subjects.

- The scientist first invites Bob to wager $100 on the result of the coin flip, offering $300 if Bob is correct. Bob refuses.
- Bill, however, is willing to pay $100 for the chance to win $150 ($50 profit) on correctly calling heads or tails because he recently lost $50 in a casino and it is important that he breaks even on gambles for the week.
- Finally, the scientist does not ask Jane to wager money but instead offers her a choice of taking $50 or winning $100 if the next coin flip comes up heads. Jane takes the $50.

Which investor has acted rationally?

A. Bob.
B. Bill.
C. Jane.

Solution

The correct answer is **C**.

Bob is likely affected by loss aversion as a 50% chance to win $300 is worth $150, but he wasn't willing to wager $100.

On the other hand, Bill is likely doing mental accounting because his previous losses are sunk costs and shouldn't motivate him to make bets with a negative expected value (a 50% chance to win $150 is only worth $75).

Jane would have made a perfectly rational decision as she should be indifferent between the two options. By taking the sure $50, she may have acted out of risk

aversion, which is often accounted for in standard financial models and not irrational behavior.