

# Market Efficiency

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## WHAT'S COVERED

In this lesson, you will learn about the different versions of the efficient market hypothesis. Specifically, this lesson will cover:

## 1. The Efficient Market Hypothesis

In finance, the efficient market hypothesis (EMH) asserts that financial markets are “informationally efficient.” Therefore, it is not possible to routinely achieve returns in excess of average market returns on a risk-adjusted basis, based upon the information on hand at the investment’s initiation.

Historically, there was a very close link between EMH and the random walk model and later, the Martingale model. The random character of stock market prices was first modeled by Jules Regnault, a French broker, in 1863 and then by Louis Bachelier, a French mathematician, in his 1900 Ph.D. thesis, “The Theory of Speculation.” His work was largely ignored until the 1950s; however, beginning in the 1930s, scattered, independent work corroborated his thesis, including a few studies which appeared to demonstrate that the random walk model did indeed apply to the U.S. stock prices and relevant financial series. In addition, research undertaken by Alfred Cowles in the ‘30s and ‘40s indicated that generally speaking, professional investors were incapable of outperforming the market.

By the mid-1960s, the efficient market hypothesis gained momentum as a leading theory, as the work of Bachelier began to be widely distributed among leading economists, beginning with the publishing of his dissertation and the above-mentioned empirical studies in a 1964 anthology edited by Paul Cootner.

Following in 1965, Eugene Fama published his dissertation in support of the random walk hypothesis, while Samuelson published his proof for his interpretation of the efficient market hypothesis. In 1970, a review of both the theory and the hypothesis was published by Fama, one that both expanded upon and refined the original theory, as well as defined all three forms of financial market efficiency:

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

### 1a. Weak-Form Efficiency

In **weak-form efficiency**, future prices cannot be predicted by analyzing prices from the past. Excess returns cannot be earned in the long run by using investment strategies based on historical share prices or other

historical data. Technical analysis techniques will not be able to consistently produce excess returns, though some forms of fundamental analysis may still provide excess returns. Share prices exhibit no serial dependencies, meaning that there are no “patterns” to asset prices.

This implies that future price movements are determined entirely by information not contained in the price series. Hence, prices must follow a random walk. This “soft” EMH does not require that prices remain at or near equilibrium, but only that market participants are not able to systematically profit from market “inefficiencies.”

However, while EMH predicts that all price movement (in the absence of change in fundamental information) is random (i.e., non-trending), many studies have shown a marked tendency for the stock markets to trend over periods of weeks or longer. Also, studies show there is a positive correlation between the degree of trending and length of time period studied (but note that over long time periods, the trending is sinusoidal in appearance). Various explanations for such large and apparently non-random price movements have been made widely known.



#### TERM TO KNOW

##### **Weak-Form Efficiency**

An efficient market hypothesis that claims future prices cannot be predicted by analyzing prices from the past.

### **1b. Semi-Strong-Form Efficiency**

In semi-strong-form efficiency, it is implied that share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information. Semi-strong-form efficiency implies that neither fundamental analysis nor technical analysis techniques will be able to reliably produce excess returns.

To test for semi-strong-form efficiency, the adjustments to previously unknown news must be of a reasonable size and must be instantaneous. To test for this, consistent upward or downward adjustments after the initial change must be looked for. If there are any such adjustments it would suggest that investors had interpreted the information in a biased fashion and, hence, in an inefficient manner.



#### TERM TO KNOW

##### **Semi-Strong-Form Efficiency**

An efficient market hypothesis that claims share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information.

### **1c. Strong-Form Efficiency**

In strong-form efficiency, share prices reflect all information, public and private, and no one can earn excess returns. If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored.

To test for strong-form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. Even if some money managers are consistently observed to beat the market, no refutation even of strong-form efficiency follows. With hundreds of thousands of fund managers worldwide, even a normal distribution of returns (as efficiency predicts) should be expected to produce a few dozen “star” performers.

**Strong-Form Efficiency**

An efficient market hypothesis that claims share prices reflect all information, public and private, and no one can earn excess returns.

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## 2. Implications and Limitations of the Efficient Market Hypothesis

Both investors and researchers have long disputed the viability of the efficient market hypothesis, on an empirical and theoretical basis. Behavioral economists, citing research by psychologists such as Daniel Kahneman, Paul Slovic, Richard Thaler, and Amos Tversky, believe that the flaws in financial markets are the result of a mix of cognitive biases like overconfidence, overreaction, information bias, representative bias, and other predictable human errors in reasoning and information processing. In their opinion, these reasoning blunders lead the majority of investors to avoid value stocks and purchase growth stocks at high prices, which in turn enable those who reason correctly to profit from the bargain-price value stocks and over-selling of growth stocks.

Empirical evidence, though varied, has typically supported strong forms of the EMH. A 1995 publication by Dreman and Berry stated that low price-to-earnings ratio stocks have greater returns, and an earlier paper by Dreman also rejected the assertion that these higher returns could be attributed to higher beta, a view put forth by Ray Ball, whose research had been used by efficient market theorists as the basis for explaining the aberration in neat accordance with modern portfolio theory.

### 2a. Speculative Economic Bubbles

Speculative economic bubbles are an obvious anomaly, in that the market often appears to be driven by buyers operating on irrational exuberance, who take little notice of underlying value. These bubbles are typically followed by an overreaction of frantic selling, allowing shrewd investors to buy stocks at bargain prices. Rational investors have difficulty profiting by shorting irrational bubbles because, as John Maynard Keynes commented, “markets can remain irrational far longer than you or I can remain solvent.”

Sudden market crashes, like the one that occurred on Black Monday in 1987, are mysterious from the perspective of efficient markets but allowed as a rare statistical event under the weak-form of EMH. One could also argue that if the hypothesis is so weak, it should not be used in statistical models due to its lack of predictive behavior.

### 2b. Transaction Costs

The impact of transaction costs on the concept of market efficiency has been underscored by further empirical work, with much of the evidence pointing to the idea that any anomalies related to market inefficiencies result from a cost-benefit analysis, performed by those individuals to whom the cost of acquiring the relevant information is worth its value in the trading process.

The concept of liquidity is another pivotal component in capturing “inefficiencies” in tests for abnormal returns. Any test of this premise encounters the joint hypothesis issue, whereby it is always impossible to test for market efficiency, given doing so necessitates the use of a measuring stick or barometer as a means of comparison with abnormal returns. In other words, you cannot determine if the market is efficient if it is not clear whether or not the model used as the basis for comparison correctly specified the required rate of

return. Thus, the state of affairs is one where either the asset pricing model is wrong or the market is inefficient, yet you have no recourse to determine which is the case.

## 2c. Late 2000s Financial Crisis

The financial crisis of 2007-2012 instigated a resurgence of scrutiny and criticism of the hypothesis. Market strategist Jeremy Grantham asserted that the EMH is responsible for the current financial crisis, alleging that acceptance of the hypothesis led to financial leaders having a “chronic underestimation of the dangers of asset bubbles breaking.” Noted financial journalist Roger Lowenstein also discredited the theory, proclaiming “the upside of the current Great Recession is that it could drive a stake through the heart of the academic nostrum known as the Efficient Market Hypothesis.” Added former Federal Reserve chairman Paul Volcker, “[it] clear that among the causes of the recent financial crisis was an unjustified faith in rational expectations and market efficiencies.”

Due to the financial crisis, Richard Posner, a prominent judge, University of Chicago law professor, and innovator in the field of Law and Economics, withdrew from the hypothesis and shifted some support toward Keynesian economics, accusing some of his Chicago School colleagues of being “asleep at the switch.” Posner declared that “the movement to deregulate the financial industry went too far by exaggerating the resilience - the self-healing power - of laissez-faire capitalism.” Other proponents of the hypothesis, like Fama himself, stated that the hypothesis fared well in the face of the crisis and that the markets were victims of the recession, not perpetrators of it. However, Fama has conceded that “poorly informed investors could theoretically lead the market astray” and could potentially cause stock prices to become “somewhat irrational.”

Critics have suggested that financial institutions and corporations have been able to decrease the efficiency of financial markets by creating private information and reducing the accuracy of conventional disclosures, and by developing new and complex products which are challenging for most market participants to evaluate and correctly price.



### SUMMARY

In this lesson, you learned that the **efficient market hypothesis (EMH)** states that security prices reflect all known information, and therefore investors cannot achieve above-average returns on a risk-adjusted basis. The EMH has since been refined into three forms of financial market efficiency called **weak-form efficiency**, **semi-strong-form efficiency**, and **strong-form efficiency**. Investors, researchers, and behavioral economists continue to study the **implications and limitations of the efficient market hypothesis**, such as its inability to explain **speculative economic bubbles**. Critics of the EMH have pointed out its inability to reckon with the concept of **transactions costs**, and some have even blamed it for the **late 2000s financial crisis**. Whether a perfect theory of the market or not, the EMH continues to be analyzed and debated today.

Best of luck in your learning!

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