
An Efficiency of Financial Markets

The Efficient Market Hypothesis

- How information in the market affects securities prices?
- The efficient market hypothesis
 - The theory of efficient capital market
- States that prices of securities in financial markets fully reflect all available information
- The return of rate from holding a security equals the sum of capital gain on the security (the change in the price) plus any cash payments, divided by the initial purchasing price of the security

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

The Efficient Market Hypothesis

- What is the expectation of this return at time t the beginning of the holding period
 - Because the current price and the cash payment C is known at the beginning
 - The only variable in the definition of the return that is uncertain is the price next period P_{t+1}
 - The expectation of the security's price at the end of the *holding period* is P^e_{t+1} , the expected return R^e is

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

The Efficient Market Hypothesis

- The efficient market hypothesis views expectations as equal to optimal forecast using all available information
 - The optimal forecast is the best guess of the future using all available information
 - This does not mean that the forecast is perfect accurate, but only that it is the best possible given the available information
 - Thus, we can write more formally
 - $P_{t+1}^e = P_{t+1}^o$
 - The expected return on the security will equal the optimal forecast of the return
 - $R^e = R^o$

Rationale Behind the Hypothesis

- What efficient market condition means in practice
 - Suppose that equilibrium return on a security is 10%
 - Its current price is P_t and it is lower than the optimal forecast of tomorrow's price P_{t+1}
 - Optimal forecast of the return is greater than the equilibrium return
- We are now able to predict that return will be abnormally high
 - Unexploited profit opportunity
 - People would be earning more than they should, given the characteristics of that security
 - Because $R^{of} > R^*$ you would buy more, which in turn drive up its current price relative to expected future price P_{t+1} and thereby lowering R^{of}
 - When the current price had risen sufficiently so that R^{of} equals R^* and the efficient market condition is satisfied, the buying of the security will be stop and the unexploited profit opportunity will have disappeared
- Similarly, a security for which the optimal forecast of the return is lower than the equilibrium return
 - It is poor investment because on average, it earns less than equilibrium return
 - In this case you will sell this security and drive down its current price relative to the expected future price until R^{of} rose to the level of R^* and the efficient market condition is again satisfied

$$\left. \begin{array}{l} R^{of} > R^* \rightarrow P_t \uparrow \rightarrow R^{of} \downarrow \\ R^{of} < R^* \rightarrow P_t \downarrow \rightarrow R^{of} \uparrow \end{array} \right\} \text{ until } R^{of} = R^*$$

Rationale Behind the Hypothesis

- In an efficient market, all unexploited profit opportunities will be eliminated
 - In the situation of unexploited profit opportunity, people will be earning more than they should
 - Knowing that, people would buy more securities, which would in turn drive up its current price and lowering the profit
 - When the current price had risen sufficiently and optimal forecast of the return will be same as equilibrium return
 - The efficient market condition is satisfied, the buying of the securities will stop and the unexploited profit opportunity will have disappeared

Rationale Behind the Hypothesis

- An extremely important factor in this reasoning is that
 - Not everyone in a financial market must be well informed about a security or have rational expectations for its price to be driven to the point at which the efficient market condition holds
 - Financial markets are structured so that many participants can play
 - As long as a few
 - Smart money
 - Keep their eyes open for unexploited profit opportunities, they will eliminate the profit opportunities that appear because in so doing, they make a profit
 - The efficient market hypothesis makes sense because it does not require everyone in a market to be cognizant of what is happening to every security
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Stronger Version of the Efficient Market Hypothesis

- An efficient market is not defined only as one in which expectations are optimal forecasts using all available information
 - But there is also add the condition that an efficient market is one in which prices reflect the true fundamental (intrinsic) value of the securities
 - Thus in an efficient market, all prices are always correct and reflect market fundamentals
 - This stronger view of market efficiency has several implications
 - First, it implies that in an efficient capital market, one investment is good as any other because the security prices are correct
 - Second, it implies that a security price reflects all available information about the intrinsic value of the security
 - Third, security can be used by managers of both financial and nonfinancial firms to assets their cost of capital
 - Cost of financing their investments
 - Accurately and hence that security prices can be used help them make he correct decisions about whether a specific investment is worth making or not
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Evidence on the Efficient Market Hypothesis

- Early evidence on the efficient market hypothesis was quite favorable to it, but in recent years, deeper analysis of the evidence suggests that the hypothesis may not always be entirely correct
 - Evidence in favor of market efficiency has examined the performance of investment analysts and mutual funds, whether stock prices reflect publicly available information, the random walk behavior of stock prices, and the success of so-called technical analysis
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Performance of Investment Analysts and Mutual Funds

- One implication of the efficient market hypothesis is that
 - When purchasing a security, you cannot expect to earn an abnormally high return, a return greater than the equilibrium return
 - This implies that is impossible to beat the market
 - Many studies shed light on whether investment advisers and mutual funds beat the market
 - On common test that has been performed is to take buy and sell recommendations from a group of advisers or mutual funds and compare the performance of the resulting selection of stocks with the market as a whole.
 - Other test is that advisers choices have been compared to a group of stocks chosen by putting the copy of the financial page of the newspaper on a dartboard and throwing darts
 - The wall Street Journal, for example, has a regular feature called “Investment Dartboard” that compares how well stocks picked by investment advisers do relative to stocks picked by throwing darts
 - To advisors embarrassment, the dartboard beats them as often as they beat the dartboard
 - Even when the comparison includes only advisors who have been successful in the past in predicting the stock market, the advisors still do not regularly beat the dartboard
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Performance of Investment Analysts and Mutual Funds

- Consistent with the efficient market hypothesis, mutual funds are also not found to beat the market
 - 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 did not beat the market in the second period
 - The conclusion from the study of investment advisers and mutual fund performance is this:
 - Having performed well in the past does not indicate that an investment adviser or a mutual fund will perform well in the future
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Ivan Boesky – mini case

- The efficient market hypothesis indicate that investment advisers should not have the ability to beat the market
 - Ivan Boesky was able to do until 1986 when he was charged by SEC with making unfair profits by trading on inside information
 - Rumored to be in the hundreds of millions
 - Boesky was banned from the security business, fined \$100 million and sentenced to three years in jail
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Ivan Boesky – mini case

- Ivan Boesky was most successful of the so-called arbitrageurs
 - He made hundreds of millions in profit by investing in the stocks of firms that were about to be taken over by other firms at an above-market price
 - Boesky continuing success was assured by cooperation with Dennis Levine
 - An investment banker who has inside information about when a takeover was to take place because his firm was arranging the financing of the deal
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Ivan Boesky – mini case

- When Levine found out that a firm was planning a takeover, he would inform Boesky, who
 - Would buy the stock of a company being taken over
 - Sell it after the stock had risen
 - Boesky's ability to make millions year after year in the 1980's in an exception that proves the rule that financial analysts cannot continually outperform the market
 - Yet it supports the efficient markets claim that only information unavailability to the market enables an investor to do so
 - Boesky profited from knowing about takeovers before the rest of the market
 - This information was known to him but unavailable to the market
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Do Stock Prices Reflect Publicly Available Information?

- The efficient market hypothesis predicts that stock prices will reflect all publicly available information
 - If information is already publicly available, a positive announcement about a company, will not raise the price of its stocks because this information is already reflected in the stock price
 - Early empirical evidence also confirmed this conjecture from the efficient market hypothesis:
 - Favorable earnings announcements or announcements of stock splits do not cause stock prices to rise
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Random-Walk Behavior of Stock Prices

- The term random walk describes the movements of a variable whose future changes cannot be predicted because given today's value, the variable is just as likely to fall as to rise
- An important implication of the efficient market hypothesis is that
 - Stock prices should approximately follow a random walk, that is
 - Future changes in stock prices should, for all practical purposes, be unpredictable

Random-Walk Behavior of Stock Prices

- Financial economists have used two types of tests to explore hypothesis that stock prices follow a random walk
 - In the first, they examine stock market records to see if changes in stock prices are systematically related to past changes and hence could have been predicted on the basis
 - The second type of test examines the data to see if publicly available information other than past stock prices could have been used to predict changes
- These tests are somewhat more stringent because additional information might be used to help forecast stock returns
- Early results from both tests generally confirmed the efficient market view that stock prices are not predictable and follow a random walk

Random-Walk Behavior of Stock Prices

- The first type of test, using only stock market data
 - It is referred as weak form efficiency because the information that can be used to predict stock prices is restricted solely to past price data
 - The second type of test is referred to as a test of semi strong-form efficiency, because the information set is expanded to include all publicity available information
 - The third type of test is called a test of strong-form efficiency because the information set includes insider information, known only to the owners of the corporations
 - Strong form test sometimes indicate that insider information can be used to predict changes in stock prices
 - This findings does not contradict efficient market theory because the information is not available to the market and cannot be reflected in market prices
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Technical Analysis

- Is to study past stock price data and search for patterns such as trends and regular cycles
- Rules for when to buy and sell stocks are then established on the basis of the patterns emerge
- The efficient market hypothesis suggests that technical analysis is waste of time
 - The simplest way to understand why is to use the random-walk result derived from the efficient market hypothesis 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

Technical Analysis

- Two types of tests bear directly on the value of technical analysis
 - The first performs the empirical analysis described earlier to evaluate the performance of any financial analyst, technical or otherwise
 - The results are exactly what the efficient market hypothesis predicts
 - Technical analysis fare no better than other financial analysts
 - They do not outperform the market, and successful past forecasting does not imply that their forecasts will outperform the market in the future
 - The second type of the test takes the rules developed in technical analysis for when to buy or sell stocks and applies them to new data. The performance of these rules is then evaluated by the profits that would have been made using them
 - These tests also discredit technical analysis
 - It does not outperform the overall market
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Evidence Against Market Efficiency

- All the early evidence supporting the efficient market hypothesis appeared to be overwhelming, causing Eugen Fama
 - In recent year, the theory has begun to show a few cracks, referred to as anomalies, and empirical evidence indicates that the efficient market hypothesis may not always be generally applicable
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Small-Firm Effect

- One of the earliest reported anomalies in which the stock market did not appear to be efficient is called the small-firm effect
- Many empirical studies have showed that small firms have earned abnormally high returns over long period of time, even when the greater risk for these firms has been taken into account
- Various theories have been developed to explain the small-firm effect
 - Suggesting that it may be due
 - Rebalancing of portfolios by institutional investors
 - Tax issues
 - Low liquidity of small-firm stocks
 - Large information costs in evaluating small firms
 - Inappropriate measurement of risk for small firm stocks

January Effect

- Over long period of time, stock prices have tended to experience an abnormal price rise from December to January that is predictable and hence inconsistent with random-walk behavior
 - Financial economists argue that the January effect is due to tax issues
 - 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 prices and eliminating the abnormal return
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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
 - A large decline, the stock prices 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 efficient market hypothesis because an investor could earn abnormally high returns, on an 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
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Excessive Volatility

- A closely related phenomenon to market overreaction is that the stock market appears to display excessive volatility
 - Fluctuations in stock prices may be much greater than is warranted by fluctuations in their fundamental value
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Mean Reversion

- Some researchers have also found that stock returns display mean reversion
 - Stock with low returns today tend to have high returns in the future, and vice versa
 - 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
- Other researchers have found that mean reversion is not nearly as strong in data after WWII
 - The evidence on mean reversion remains controversial

Practical Guide to Investing in the Stock Market

- The EFH has numerous applications to the real world
 - How valuable are publisher reports by investments advisers?
 - Should you be skeptical of hot tips?
 - Do stock prices always rise when there is good news
 - Efficient markets prescription for the investor
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How Valuable Are Publisher Reports by Investments Advisers?

- The EMH tells that when purchasing a security we cannot expect to earn an abnormally high return
 - Return greater than the equilibrium return
 - Information in newspapers and publisher reports is readily available to many markets participants and it is already reflected in market prices
 - So acting on this information will not yield abnormally high returns, on average
 - Recommendations from investment advisers cannot help us outperform the general market
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Should You Hire an Ape Your Investment Adviser

- The San Francisco Chronicle
 - Evaluation how successful investment advisers are at picking stocks
 - Asked 8 analysts to pick five stocks at the beginning of the year and then compared the performance of their stocks picks to those chosen by Jolyn
 - An orangutan
 - Jolyn beat the investment advisers as often as they beat her
 - You might be just as well off hiring an orangutan as your investment adviser as you would hiring a human being
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Should you be skeptical of hot tips?

- The EMH indicates that you should be skeptical of hot tips
 - If the stock market is efficient
 - The expected return will equal the equilibrium return
 - The hot tip is not particularly valuable and will not enable to earn an abnormally high return
 - If a hot tip is based on new information and market participants have gotten this information before you
 - you are not able to outperform the market
 - As soon as the information hits the street, the unexploited profit opportunity it creates will be eliminated
 - The stock's price will already reflect the information and investor should expect to realize only equilibrium return
 - If an investor is one of the first to know the new information
 - Only then can an investor earn an abnormally high return
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Do Stock Prices Always Rise When There Is Good News?

- When good news about a stock, e.g. favorable earning report, is announced, the price of the stock frequently does not rise
 - EMH and the random walk behavior of stock prices explain this phenomenon
 - Because changes in stock prices are unpredictable, when information is announced that has already been expected by the market, stock price will remain unchanged
 - The announcement does not contain any new information that should lead to a change in stock prices
 - If this were not the case of announcement led to a change in stock prices, it would mean that that the change was predictable
 - Because that is ruled out in an efficient market, stock prices will respond to announcements only when the information being announced is new and unexpected
 - Sometimes a stock prices declines when good news is announced
 - The announced news is good but it is not as good as expected
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Efficient markets prescription for the investor

- What does the EMH recommend for investing in the stock market?
 - Tips, investment adviser's publisher recommendations, and technical analysis
 - Which are made use of publicly available information cannot help an investor outperform the market
 - Investors should not try to outguess the market by constantly buying and selling securities
 - This process does nothing but boost the income of brokers, who earn commissions on each trade
 - Investors should pursue a buy and hold strategy
 - Purchase a stock and hold it for long period of time
 - This will lead to the same returns, but investors net profit will be higher because fewer brokerage commissions will have to be paid
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Thank you for your attention
