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The Efficient-Market Hypothesis During a Recession

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THE EFFICIENT-MARKET HYPOTHESIS DURING A RECESSION

by

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Introduction

The phrase, "A Random Walk Down Wall Street" may make a portfolio manager shudder. I first learned about this theory while reading a book of the same name by Burton G. Malkiel. I saw the last four years crashing down around me as I read about the competition I would be facing upon graduation—a blindfolded chimpanzee.

The random walk theorizes that the stock market is so efficient that a blindfolded chimpanzee can throw darts at the Wall Street Journal to select a portfolio of stocks that will perform equally as well as those managed by the experts. Unfortunately for the experts, this theory has held up surprisingly well for over thirty years. The unmanaged S&P 500-Stock Index has produced a greater return than more than two-thirds of portfolios managed by professional portfolio managers. Still, studies have indicated that the market might not be as efficient as the chimpanzee would hope (Malkiel, 1999, p. 15).

The Efficient-Market Hypothesis

The Efficient-Market Hypothesis (EMH) states that an investor cannot consistently beat the market because stock prices quickly reflect information about the company, as well as its expected returns, risk, etc. If a company's price is undervalued/overvalued—its current price is lower/higher than its expected price tomorrow—investors will drive up/down the price of the stock until the price today equals its expected price tomorrow (Mishkin & Eakins, 2002, p. 277). There are three forms of the efficient market theory: the weak, the semi-strong, and the strong.

Weak Form – The Random Walk

In its weakest form, the EMH states that it is impossible to use past stock market data (price sequences, volume information, price changes, etc) to predict future stock prices (Malkiel,

1999, p. 118). In particular, the EMH implies that there is no relation between past and future price changes. Therefore, price changes are independent of each other i.e., they exhibit random movements. This observation implies that trading rules based on past stock market information do not exhibit returns greater than those of a buy and hold strategy. Technical analysts, or chartists, do not believe in this form of the efficient-market theory, and attempt to interpret stock charts to discover the trends of the stock. Stock charts show the daily highs and lows of a stock price over a period of time. Chartists believe that stocks have momentum; thus, a stock price that is increasing will continue to increase—that is, until it hits its "resistance level"(Malkiel, 1999, p. 125) and then begins decreasing till it hits its "support level"(Malkiel, 1999, p. 126) and bounces back up again. Technical analysts explain this momentum with the concept of mass psychology. When investors see a stock price increasing, they will want to take part in the increase and purchase the stock. As more investors take part in the opportunity, the price continues to increase, creating more profit for the investors. Unfortunately for chartists, stock price reversals often occur quite suddenly. By the time the trend of a stock is apparent, the analyst has often already missed out on its respective opportunity (Malkiel, 1999, p. 126).

Is there momentum in the stock market? What use do these charts really have? In a test comparing the price change for a stock in one day with the price change in a stock the following day, only a very slight positive correlation was found. Past price movements cannot predict future price movements at any degree of statistical significance (Malkiel, 1999, p. 141). Being able to identify a specific pattern on a chart is no more likely than finding only random movement (Malkiel, 1999, p. 142). This empirical evidence shows that the weak form of the efficient market theory holds.

Semi-Strong Form

The semi-strong version of the EMH states that publicly available information will not assist the investor in achieving excess future returns (Malkiel, 1999, p. 118). This form of the hypothesis infers that security prices adjust quickly to the release of all new public information and therefore investors cannot make excess returns on important information after it has become public. Excess returns are returns greater than may be expected on the basis of risk faced by investors. The semi-strong EMH implies, therefore that ex-post fundamental analysis, is of little use in obtaining higher than average investment returns. Fundamental analysts use the financial statements and other publicly available information of a company to predict growth, dividend payout, interest rates, and risk (Malkiel, 1999, p. 119). These factors are used to determine a stock's intrinsic value. Fundamentalists will buy stocks if they estimate the intrinsic value to be above the current market price of the stock.

Since financial information is accessible and relatively costless, and since the market is full of information seeking, profit-maximizers, additional research will not allow an investor to experience excess returns. This is the efficient market paradox. Without fundamental researchers, the market would be inefficient, but any additional research does not add any marginal benefit for the investor. The public will be aware of public knowledge, and therefore security prices will reflect that information. Thus an investor who reads the same company press releases that every other investor reads, will be unable to beat the market. It is important to note however, that analysts who have demonstrated superior forecasting, i.e., are better at ex-ante analysis, tend to outperform the market. Thus analysts cannot rely on past variables, but must project variables that influence the overall economy, aggregate stock market, industry and firm.

In his book, Malkiel identifies three faults of fundamental analysis: the information and analysis may contain errors, the analyst's estimate of "value" may be incorrect, and the market might not correct for its "mistake" and revalue the stock price (1999, p. 128). John Cragg and Malkiel performed a study to see how accurate the predictions of fundamental analysts are. Using 19 of the top firms on Wall Street, their results showed that no analyst was consistently more accurate than others. Generally speaking, when using their fundamental techniques, the analysts were unable to consistently predict earnings for specific companies for either one-year or five-year periods. They also were not accurate in forecasting for specific industries (1999, pp. 168-169). Given Malkiel's results, it does not make sense for the market to react to announcements that a company has missed its earnings target by one penny. The implication of Malkiel's research is: if analysts cannot forecast earnings, how do we know if companies missed estimates? The only way for companies to meet earning estimates is to fudge the books, which is part of the problem in today's market.

Another argument against fundamental analysis is the "Investment Dartboard" found in the Wall Street Journal. This feature compares a portfolio of stocks picked by investment advisers with stocks picked by throwing darts at the Wall Street Journal. The dartboard beats the analysts just as often as the analysts beat the dartboard. Additionally, a comparison including only analysts who have previously beaten the dartboard will show that they still do not consistently beat the dartboard (Mishkins & Eakins, 2002, p. 279).

In one study of the Investment Dartboard, Ronald L. Moy (1994) compared a portfolio of four stocks picked by pros, a portfolio of four stocks picked by darts, and the Dow Jones Industrial Average portfolio of 30 large-firm stocks for 33 months. The DJIA performed superiorly for only six of those months, while the darts and pros won 12 and 15 times respectively. Even more

interesting, during months when the DJIA fell, the pros, darts, and DJIA all ranked first four times. In months when the DJIA rose, the DJIA was outperformed all but two times. The pros were first 11 times, while the darts were best 8 times. Thus, it seems that the pros (and the darts to some extent) were able to select stocks that did extraordinarily well when the market was good. Because the pros were unable to predict overall movements in the market, their portfolios did not perform as well when the market was declining. The performance outline above was not risk adjusted. Capital market theory suggest that risk adjusted performance is the appropriate measure of any comparison between portfolio. The Sharpe/Lintner Capital Asset Pricing Model is premised on the existence of an efficient capital market. The Dartboard results are consistent with what an investor could expect in efficient market as described by the CAPM. That is the "apparent" excess performance of the pro portfolio was reduced because of the higher level of risk in the pro's portfolio relative to the DJIA.

Strong Form

According to the theory's strong form, nothing -- not even insider information — can assist in predicting future stock prices because everything knowable is already impounded in the current price (Malkiel, 1999, p. 118). That is, all information is efficiently incorporated into prices and prices adjust quickly to all new information.

Insiders are defined as anyone who owns more than 10% of a company's common stock, or the company's corporate officers or directors. Whenever insiders change their holdings within the company, they are required to file a report with the Securities and Exchange Commission (SEC). This information is then published in the SEC "Official Summary of Transactions." Contrary to the strong form of the MH, insiders have been able to make extraordinarily large returns on the stocks of their own companies. A study by H. Nejat Seyhun over the time period

1975-1981, showed that stocks purchased by insiders would earn an average positive abnormal return of 4.3% from the time they were purchased through the next 14 months (Smith, Proffit, & Stephens, 1992, p. 240).

Summary

While the EMH may seem to chill the investment process, it is important to understand what the EMH does not say. The EMH does not say anything about selecting securities that will outperform other securities. Indeed given that investors are risk adverse it would be surprising if all securities offered the same return.

The EMH does not say anything about decomposing price movement into component factory (market, industry or firm). Thus investors need to understand what factors may drive price and returns. If this information is "consistently" used to create superior "forecasts" those analysts may be expected, even under the EMH, to experience superior returns.

Finally, the EMH does not say that price will not go up and down over time. Historical returns are very good. Thus the EMH implies nothing about investors' average returns, but it does say an investor will not see "consistently" above average returns.

Evidence Against the Efficient-Market Hypothesis

While most research supports the EMH, there are a few indications that the theory may not be applicable in all situations. Anomalies of the efficient-market theory are based on the small-firm effect, the January effect, market overreaction, excessive volatility, mean reversion, and the idea stock prices do not always immediately incorporate new information.

Small-Firm Effect

Small firms generally have a higher return over long periods of time, even when their greater risk is accounted for. Theories used to explain this anomaly consider the "rebalancing of portfolios by institutional investors, tax issues, low liquidity of small-firm stocks, large information costs in evaluating small firms, or an inappropriate measure of risk for small firm stocks" (Mishkin & Eakins, 2002, p. 282).

January Effect

An abnormal increase in stock prices occurs from December to January that has become predictable and contradictory with the efficient-market theory's concept of random-walk behavior. This is argued to be due to an increase in the selling of stocks by investors in order to claim capital losses on their tax return and reduce their tax liability. Thus, the rush to sell drives prices down in December, while the rush to buy back the stock in January pushes prices up (Mishkin & Eakins, 2002, pp. 282-283).

Market Overreaction

Research shows that news announcements cause stock prices to overreact followed by a slow correction of the pricing error. In this situation, an investor could profit after an announcement of a large decline in earning by purchasing the stock at its low and reselling it after it climbs back up to its efficient level (Mishkin & Eakins, 2002, p. 283).

Excessive Volatility

The price of a security can vary greatly within one day. Does this mean the underlying value of the company is fluctuating as well? The fluctuations of a stock price occur more frequently than is reasonable by changes of a stock's value. This demonstrates that stock prices are

driven by factors other than the fundamentals found within the EMH (Mishkin & Eakins, 2002, p. 283).

Mean Reversion

Stocks currently offering low returns are likely to have high returns in the future, and vice versa. While this abnormality was apparent before the 1940s, post World War II data shows that mean reversion is no longer as significant. Thus, it might not currently be an exception to the EMH (Mishkin & Eakins, 2002, pp. 283-284).

Stock Prices Do Not Always Immediately Incorporate New Information

Stock prices might not instantaneously adjust to news announcements. On average, prices continue to rise (or fall) for a longer period of time following the announcement (Mishkin & Eakins, 2002, p. 284).

Summary

Although these concepts show that the market might not always be efficient, they do not occur with enough frequency to disprove the EMH. However, these anomalies are important because they reveal that there might be more to evaluating financial markets then what is found in the EMH. Still, the EMH is a good place to start, as its basic concepts are widely accepted in academia.

Testing the Efficient-Market Hypothesis

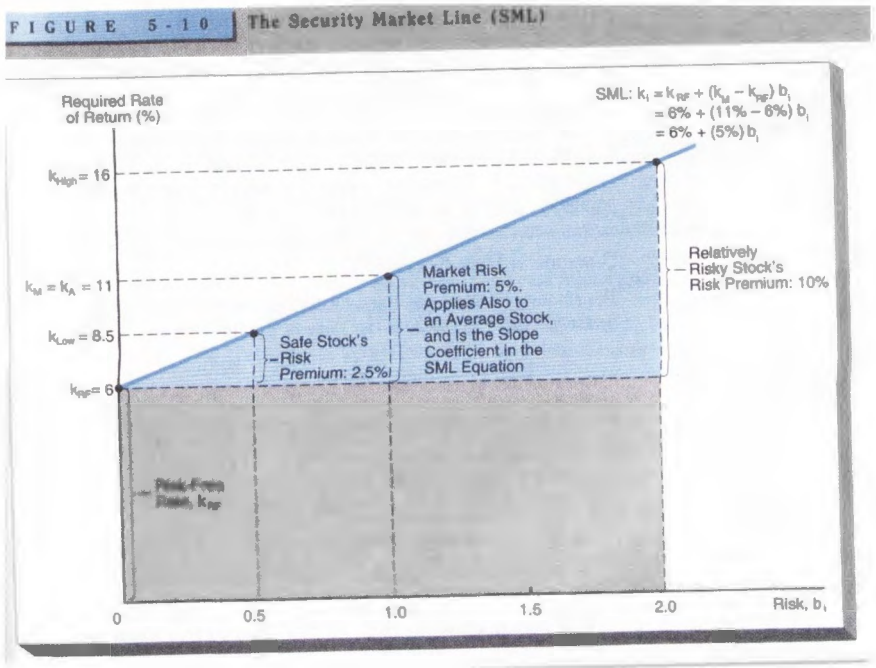
The EMH can greatly affect the career of a financial analyst. If it proves to be correct, then I might lose my job to a dart-throwing monkey. This research compares the performance of student-analyzed securities relative to the S&P 500. In a course on investing at Utah State University during Spring Semester 2001, Fall Semester 2001, and Spring Semester 2002, Dr. Alan Stephens taught his students basic principles of investing, techniques to analyze companies, and

the Capital Asset Pricing Model (CAPM). For the final project, groups of 3-5 students chose a company to research and analyze, ultimately deciding whether to buy or not buy the companies stock.

Basically, CAPM is "a model based on the proposition that any stock's required rate of return is equal to the risk-free rate of return plus a risk premium which reflects only the risk remaining after diversification" (Brigham & Houston, 1999, p. 171). The model has five key ideas (Brigham & Houston, 1999, p. 174-175):

1. The risk of a stock is made up of market, or systematic, risk, and diversifiable, or nonsystematic risk. Market risks cannot be eliminated as is caused by factors such as war, inflation, and high interest rates. Diversifiable risks can be eliminated and are caused by random events, such as strikes, lawsuits, and winning or losing major contracts.
2. Diversifiable risk can be reduced or eliminated by increasing the number of stocks in a portfolio and investing in several different industries and types of companies.
3. Stocks with greater systematic risk will have a higher required rate of return. Stocks with greater nonsystematic risk will not have a higher required rate of return, as diversified investors can eliminate that risk.
4. The beta coefficient of a stock measures the stock's contribution of riskiness to a portfolio. A beta of 1.0 means that a stock is of average risk. A stock with a beta of 0.5 is half as volatile as the average stock, while a stock with a beta of 2.0 is twice as volatile as the average stock.
5. The most significant measure of any stock's risk is its beta.

The relationship between risk and beta for individual stocks can be graphed to develop the Security Market Line (SML). A graph from Brigham and Houston's (1999) text best depicts the SML and its respective equation:



In the investment class, the students used fundamental analysis to analyze firms. They then recommended to either buy or don't buy stock in that firm. For this analysis, all of the "buy" stocks were grouped into a portfolio. Next, the return of the portfolio was compared with the return of the S&P 500 as the market. The holding period for each portfolio was 98 trading days. The daily return was calculated from the previous day by the following equation, which is have dubbed the "daily return equation:"

$$\text{Daily Return} = (\text{Price}_{\text{today}} - \text{Price}_{\text{yesterday}})/\text{Price}_{\text{yesterday}}$$

An average of the daily returns was taken from the daily return for each of the 98 days. The results are shown as the S&P 500 Return (average) and Portfolio Return (average) in Exhibit 1.

The beta of the portfolio was found by running a regression with the portfolio as the dependent variable and S&P 500 as the independent variable. These results can also be seen in Exhibit 1.

Exhibit 1

Semester *(Holding Period)*	**Spring 2001** *(4/23/02-9/10/01)*	**Fall 2001** *(12/11/01-5/2/02)*	**Spring 2002** *(5/3/02-9/20/02)*
S&P 500 Return (average)	-0.23%	-0.04%	-0.11%
Portfolio Return (average)	-0.22%	0.10%	0.00%
S&P 500 Return (cumulative)	-10.77%	-4.59%	-21.24%
Portfolio Return (cumulative)	-0.82%	9.85%	-20.62%
Portfolio Beta	0.3323	0.6169	0.2930

As shown by Exhibit 1, the students' portfolio consistently outperformed the market. However, this does not mean that the EMH can be rejected for several reasons. First the return must be adjusted for risk. Unfortunately, because the market was in a recession during the three time periods, this issue becomes tricky. Under normal market conditions, the risk-adjusted return could have been found by dividing the average daily return by the beta. When the market's return is negative, normal performance measures that adjust for risk break down because the CAPM and the SML do not recognize negative slopes. Thus, another measure of performance was developed.

This risk-adjusted measure of performance, which can be called the "cumulative daily return," is written as:

$$\text{Cumulative Daily Return} = (\text{Price}_{\text{today}} - \text{Price}_{\text{when purchased}})/\text{Price}_{\text{when purchased}}$$

The results are shown for day 98 as the S&P 500 Return (cumulative) and Portfolio Return (cumulative) in Exhibit 1. For the portfolio Spring Semester 2001, the student portfolio had a higher return than the S&P 500, although the return was still negative. During Fall Semester

2001, the student portfolio performed considerably better than the market, and in fact had a moderately high positive return even during a recession. The student portfolio's return was just barely above that of the S&P 500 for Spring Semester 2002. Thus, even under a risk-adjusted performance measurement it appears that the student portfolios consistently outperformed the market.

However, the students of these classes still cannot claim they are expert portfolio managers because these results are not scientifically valid. These observations were limited in number and in their time period. But it does give an indication that security analysis improves performance relative to the market during a negative market period.

Conclusion

With a few exceptions, the Efficient-Market Hypothesis can generally not be rejected. Hence, under normal market conditions financial analysts cannot consistently beat the market. Within the EMH, an analyst may be able to beat the market if his/her ex-ante estimates of security performance are superior to those of other investors. To do this, the analyst must have knowledge of how a security's risk is measured and how this risk relates to the expected return. Over a study of three time periods, portfolios of student-chosen stocks had a higher return than the S&P 500 Index. This study indicates that using analysis techniques such as the Capital Asset Pricing Model can increase a financial analyst's ability to estimate security performance during a recession.

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