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## **Literature Review**

### **I. Introduction**

Despite its popularity in academic circles and its heavy influence on modern investment theory, the Efficient Markets Hypothesis (EMH) is not a view deeply embraced by many investors actually participating in the financial markets. The origins of efficient markets hypothesis dates back to 1965 when Samuelson (1965) published his proof that properly anticipated prices fluctuate randomly. The term “efficient market” was first introduced into economics literature by Fama *et al.* (1970) along with three classifications: strong, semi-strong, and weak form efficiency. An implication of strong and semi-strong form of EMH is that any kind of investment strategy would be as likely to produce above-market returns as a coin flipped at random. Most investors who disagree with this point would point to the empirical evidence of certain market pricing anomalies. In fact, investors would not waste time researching investments if they believed that market were efficient; they must presume that markets are not efficient. Research in behavioral finance has also attempted to prove the existence of market trends which would suggest that stock prices do not move randomly (Lo, 1999). Recently, Lo (2004) introduced the Adaptive Markets Hypothesis (AMH) in an attempt to support the behavioralist argument by providing an evolutionary theoretical framework to support the already abundant number of arguments against efficient markets.

In this literature review, I open with a motivation section, which will explain why this research is relevant to Economics. The next section presents a brief overview of the Efficient Markets Hypothesis and then summarizes empirical findings of anomalies in market pricing. I will then turn to the theory behind Adaptive Markets Hypothesis as well as case studies. Finally, I will summarize past research conducted on Asian financial markets, especially those pertaining to my anticipated area of concentration, the Hong Kong Stock Exchange.

## **II. Motivation**

The stock market indirectly guides investment by transferring two kinds of information: information about investment opportunities and information about managers' past decisions. Capital budgeting theory states that in evaluating investment projects, expected cash flows are discounted at risk-adjusted rates of return. Rather than undertake the costly effort to determine the value of the project, the manager can rely on the company's stock price movement to judge whether or not it has positive Net Present Value (NPV). The underlying reasoning is that traders will seek to realize this profit opportunity by attaining and analyzing the necessary data. Specifically, information about similar investment projects in the past is studied by traders in the stock market to determine the discounted risk-adjusted rates of return. In equilibrium, information in stock prices will guide investment decisions because managers will be compensated based on informative stock prices in the future. Under an efficient market, the price will move towards this equilibrium, which reflects the company's value as if it had already taken on the project.

Dow and Gordon (1997) suggest that the stock market may not be a necessary institution for the efficient allocation of equity, because stock prices only play an indirect role in which investment projects the company decides to take on. Nonetheless, it is still a very important

signal for managers to use when evaluating an investment opportunity. Thus, studying the efficiency of the stock market will have correlation to the overall efficiency of the economy.

## **II. Efficient Markets Hypothesis**

As introduced by Fama *et al.* (1970), there are three types of efficient markets: (1) strong form, (2) semi-strong form, and (3) weak efficiency. The “weak” form asserts that only past data is fully reflected in security prices. The “semi-strong” form, also “information-arbitrage efficiency,” claims that all publicly available information is reflected in prices. Finally, the “strong” form, also known as “fundamental-value efficiency” asserts that security prices reflect all information. The semi-strong form of EMH is generally the basis for most empirical research. Most economists have ruled out strong form as a condition to when examining the financial markets, because of its strong assumptions.

Grossman and Stiglitz (1980) argue that perfectly informationally efficient markets are an *impossibility*, because if there were no profit in gathering information, the markets would generate so little trading volume that this would cause an inefficiency. They proposed that the degree of market inefficiency determines investors’ efforts to gather and trade on information.

## **III. Anomalies**

One of the most controversial results of EMH is that efficient markets do not allow investors to earn above-average returns without accepting above-average risks, except through luck.

Historical evidence supporting the contrary is abundant, and these examples as classified as asset pricing “anomalies.” In this section, I will outline some these compelling cases.

A. *The January Effect*: Rozeff and Kinney (1976) found a higher mean return in January as compared to other months, using NYSE stocks between 1904 and 1974. The average return in January was 3.48 percent as opposed to only 0.42 percent for all other months. The same effect was found in more recent data by Bhardwaj and Brooks (1992) and Eleswarapu and Reinganum (1993) and in other countries by Gultekin and Gultekin (1983). The authors offer a tax-loss selling explanation for this anomaly.

B. *The Monday Effect*: French (1980) found a tendency for the returns of U.S. stocks to be negative on Mondays and positive on other days of the week using data between 1953-1977. This anomaly strongly supports AMH, since Kamara (1997) later found that the S&P 500 no longer showed significant Monday effects after April 1982.

C. *The Small Firm Effect*: Banz (1981) and Reinganum (1981) analyzed stocks of low capitalization companies in the period 1936-1975. Reinganum found that risk adjusted annual return of small firms was greater than 20%.

D. *The P/E Ratio Effect*: Basu (1997) looked at companies with low price-to-earnings ratios and found that between 1957 and 1971, these stocks performed significantly better than market returns. Campbell and Shiller (1998) showed that P/E ratios have a reliable forecast power.

E. *The S&P Index Effect*: Harris and Gurel (1986) and Shleifer (1986) found that in the past, news of a stock's inclusion into the S&P 500 index would significantly increase the share price. This information is not about the firm itself, so it is surprising to see this news affect its stock price.

F. *The Weather Effect*: Saunders (1993) found the NYSE index tended to be negative when it is cloudy. Hirshleifer and Shumway (2001) analyzed data from 26 countries from 1982-1997 and found that in almost all of the countries studied, stock market returns were positively correlated with sunshine and that snow and rain had no predictive power.

### **III. Adaptive Markets Hypothesis**

Most investors and economists agree that there are no long-term return anomalies in the financial markets (Lakonishok, Shleifer and Vishny (1994), Fama (1997)). Their viewpoints differ on whether or not there exist any short-term opportunities that can be exploited. Recent behavioralist studies such as Shleifer and Vishny (1990), Odean (1998), Daniel et al (2000), Hong et al (1999) have found that there are certain limits to arbitrage, which prevent markets from reaching higher levels of efficiency. As a result of these constraints on arbitrage, individual irrationality can spread to the market. The psychological causes for irrationality have been well documented, for example by Barberis and Thaler (2002). Psychologists have found that people act irrationally due to: overconfidence, optimism and wishful thinking, representativeness, conservatism, belief perseverance, anchoring, and availability biases. Critics of behavioral finance state that the asset pricing “anomaly” models can only fit a specific case, but they do not offer a satisfactory general framework of their own. This is where the Adaptive Markets Hypothesis (Lo, 2004) comes in.

Rather than taking the neoclassical approach of attempting to maximize expected utility and assuming rational expectations, AMH has an evolutionary perspective and views agents (investors) simply as dynamic organisms that have adapted through generations of natural selection and have a goal of maximizing returns. Individuals act in their own self interest, and

can make mistakes, learn, and adapt. In addition, competition drives adaptation and innovation, natural selection shapes market ecology, and evolution determines market dynamics. Under this fundamental framework, the AMH offers a viable alternative to EMH while taking into account the biases found in behavioral finance.

Neely, Weller, and Ulrich (2007) tested the validity of claims (Brock, Lakonishok, and Lebaron (1992), Sullivan, Timmermann, and White (1999)) to excess returns from using technical trading rules in the foreign exchange market. Using out-of-sample performance data, they found that excess returns during the period 1970-1990 were genuine and not a result of data mining. By the early 1990s, these opportunities disappeared, most likely due to a general awareness of these successful strategies among investors and the adoption of filter and moving average rules.

#### **IV. Asian Markets**

The vast majority of case study research on the efficiency of financial markets to date has focused on the major United States and European securities market. In this section, I will discuss a couple papers related to the Asian stock markets.

Los (1998) applied nonparametric efficiency testing on several Asian stock markets using data from 1986 to 1996. He presented a tentative ranking order of stock market efficiency: Singapore, Thailand, Indonesia, Malaysia, Hong Kong and Taiwan, from most to least efficient. Srivstava (2004) found evidence that the Indian stock markets were weak form efficient using an autocorrelation test.

## References

- Banz, R., "The relationship between return and market value of common stocks," *Journal of Financial Economics* 9 (1981): 3-18.
- Basu, S., "Investment performance of common stocks in relation to their price-earning ratios: A test of the efficient market hypothesis," *Journal of Finance* 32 (1977): 663-682.
- Barberis, N. and Thaler, R. H., "A Survey of Behavioral Finance" (September 2002). Available at SSRN: <http://ssrn.com/abstract=327880> or DOI: [10.2139/ssrn.327880](https://doi.org/10.2139/ssrn.327880)
- Bhardwaj, R.K. and L.D. Brooks., "The January anomaly: Effects of low share price, transaction costs, and bid-ask bias," *Journal of Finance* 47 (1992): 553-575.
- Brock, W., J. Lakonishok, and B. LeBaron. "Simple Technical Trading Rules and the Stochastic Properties of Stock Returns," *Journal of Finance*, 47 (1992): 1731-1764.
- Campbell, J.Y., and R.J. Shiller., "Stock prices, earnings and expected dividends," *Journal of Finance* 43 (1988): 661-76.
- Daniel, Kent, Hirshleifer, D, and Subrahmanyam., "Covariance Risk, Mispricing, and the Cross Section of Security Returns," *Journal of Finance* (2000).
- Dow, James and Gorton, Gary. "Stock Market Efficiency and Economic Efficiency: Is There a Connection?" *Journal of Finance*, American Finance Association, vol. 52(3), July 1997: 1087-1129.
- Eleswarapu, V.R. and M.R. Reinganum., "The seasonal behavior of the liquidity premium in asset pricing," *Journal of Financial Economics* 34 (1993): 373-386.
- Fama, E. F., "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* (1970): 383-417.
- Fama, E. F., "Market Efficiency, Long-Term Returns, and Behavioral Finance" (February 1997). Available at SSRN: <http://ssrn.com/abstract=15108> or DOI: [10.2139/ssrn.15108](https://doi.org/10.2139/ssrn.15108)
- Fama, E.F., and M. Blume. "Filter Rules and Stock Market Trading Profits." *Journal of Business*, 39 (1966):226-241.
- French, K.R., "Stock returns and the weekend effect," *Journal of Financial Economics* 8 (1980): 55-69.
- Grossman, S., "On the Efficiency of Competitive Stock Markets Where Trades Have Diverse Information." *The Journal of Finance* (1976): 573-585.

- Grossman, Sanford and Stiglitz, Joseph E., "On the Impossibility of Informationally Efficient Markets" *American Economic Review*, 70(3), June 1980: 393-408.
- Gultekin, M. and B. Gultekin., "Stock market seasonality: International evidence," *Journal of Financial Economics* 12 (1983): 469-481.
- Harris, L. and E. Gurel., "Price and volume effects associated with changes in the S&P 500 list: New evidence for the existence of price pressures," *Journal of Finance* 41 (1986): 815-829.
- Hirshleifer, D. and T. Shumway., "Good day sunshine: Stock returns and the weather," SSRN Working Paper, Forthcoming, *Journal of Finance* (2001).
- Hong, Harrison, and Jeremy Stein., "A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets," *Journal of Finance*. 54 no. 6 (1999).
- Kamara, A., "New evidence on the Monday seasonal in stock returns," *Journal of Business* 70 (1997): 63-84.
- Rozeff, M.S., and W.R. Kinney., "Capital market seasonality: The case of stock returns," *Journal of Financial Economics* 3 (1976): 379-402.
- Lo, A., "The Adaptive Markets Hypothesis: Market Efficiency from an Evolutionary Perspective." (2004) *Journal of Portfolio Management*, Forthcoming Available at SSRN: <http://ssrn.com/abstract=602222>
- Lo, A., "Reconciling Efficient Markets with Behavioral Finance: The Adaptive Markets Hypothesis." *Journal of Investment Consulting* 7 (2005): 21-44.
- Los, Cornelis A., "Nonparametric Efficiency Testing of Asian Stock Markets Using Weekly Data" (December 1998). Centre for Research in Financial Services Working Paper No. 99-01. Available at SSRN: <http://ssrn.com/abstract=143950> or DOI: [10.2139/ssrn.143950](https://doi.org/10.2139/ssrn.143950)
- Malkiel, B. *A Random Walk Down Wall Street*. 6th ed. New York: W.W. Norton & Company, Inc., 1973.
- Malkiel B., "The Efficient Market Hypothesis and It's Critics." *Journal of Economic Perspectives*, 17 (2003): 59 – 82.
- Reinganum, R.M., "Misspecification of the capital asset pricing: Empirical anomalies based on earnings yields and market values," *Journal of Financial Economics* 12 (1981): 89-104.
- Samuelson, P. "Proof that properly anticipated prices fluctuate randomly." *Industrial Management Review* 6 (1965): 41–49.

Saunders, E.M.J., "Stock prices and Wall Street weather," *American Economic Review* 83 (1993): 1337-1345.

Shleifer, A. and Vishny, R., "The limits of arbitrage," *Journal of Finance*, 52 (1990):35-55.

Shleifer, A., "Do demand curves for stocks slope down," *Journal of Finance* 41 (1986): 579-590.

Srivastava, Aman S., "Are Asian Stock Markets Efficient?: An Evidence from India" (2004).  
Available at SSRN: <http://ssrn.com/abstract=666661>

Sullivan, R., A. Timmerman, and H. White., "Data-Snooping, Technical Trading Rule performance, and the Bootstrap," *Journal of Finance*, 54 (1994):1647-1691.

Odean, Terrance., "Volume, volatility, price and profit when all traders are above average," *Journal of Finance* 53 (1998): 1887-1934.