Research on the Efficient Market Hypothesis: A Review

Saloni Gupta

Associate Professor, Department of Commerce, Bharti College, University of Delhi

Email Id: salonigupta0609@gmail.com

Abstract. A periodic review of research done in any field is of significance for research and policy makers. While researchers can use the review to identify research gaps and gather reference bibliographic material; decision makers and policy makers can recommend the path to developments and make use of research findings to support their decisions or policies suitably. This paper is an attempt to review the theoretical and empirical literature on the efficient market model as has evolved. The study will provide a comprehensive commentary on the nature of research done on the stock market efficiency, with particular reference to India, in recent years and findings thereof.

Keywords: Literature, Stock market, efficient market

Introduction

A periodic review of research done in any field is of significance to both researchers and policy makers. While researchers can use the review to identify research gaps and gather reference bibliographic material; decision makers and policy formulators can understand and appreciate the progression of the developments, to use the research findings to shape their decisions or policies suitably. Also, the new entrants to a field can get a bird's eye view of the state of research in that field through such a review. The objective of this paper, therefore, is to provide to these interest groups a comprehensive commentary on the nature of research done on the stock market efficiency, with particular reference to India, in recent years and findings thereof.

However, a review of this kind invariably presents considerable difficulties. What comprises research? What should be the period of review? What should be the objectives of a review? How does one ensure that the coverage is comprehensive? It is clear that questions outlined above are capable of generating varied responses. I would, therefore, begin by briefly outlining the basis on which the review has been done in this section. I have primarily reviewed work done in India and US from 1965 till date, though we have included some other important

studies too. The literature is now so large that a full review is impossible, and is not attempted here. Instead, I discuss the work that I find most significant and interesting, and I offer my views on what we have learnt from the research on market efficiency in its various dimensions and implications. My objective is to provide an outline of the various studies including their objective, data source, methodology and important findings, along with a synthesis of important findings with others as they emerged. Despite my best efforts, abstracts of all works could not be obtained or prepared. In such cases, the works have merely been listed in the bibliography for further ready reference.

All the empirical research on the theory of efficient markets has been concerned with whether prices "fully reflect" particular subset of available information. The initial studies were concerned with what we call *weak-form tests* in which the information subset of interest is just past price (or return) histories. Most of the results here come from the random walk literature. When extensive tests seemed to support the efficiency hypothesis at this level, attention was turned to *semi-strong form tests* in which the concern is the speed of price adjustment to other publicly available information (e.g., announcements of stock splits, annual reports, new security issues, etc.) Finally, of more recent origin are the *strong form tests* in which the concern is the market's ability to adjust and reflect, in security prices, even the special or private information.

As more and more researches were conducted in more and more dimensions of the related aspects of efficiency, the need was felt for a more broad-based terminological categorisation, which would provide a wider umbrella for understanding and synthesizing these diverse but inter related dimensions. Instead of weak-form tests, which are only concerned with the forecast power of past returns, the first category now covers the more general area of *tests for return predictability*, which also includes the voluminous work on forecasting returns with variables like dividends yields and interest rates. Since market efficiency and equilibrium-pricing issues are inseparable the discussion also includes tests of asset-pricing models and anomalies like seasonality, size effect, volatility, weekday effect etc. For second and third categories the now popular names are *event studies* and *tests for private information* respectively. My review follows this new classification and seeks to capture the essence of empirical research in more or less this historical sequence.

Bachelier (1900) worked on asset pricing and developed many mathematical properties of Brownian motion and martingales, which were the earlier mathematical expression of market efficiency. In most of the pre-1970 literature, the common equilibrium pricing model in tests of stock market efficiency was the hypothesis that 'expected returns are constant through time'. Market efficiency then implied that 'returns are unpredictable from past returns or other past variables, as prices follow a random walk'. Kendall (1953), Roberts (1959), Granger and Morgenstern (1963), Samuelson (1965) and Mandelbrot (1966) found support for the random walk hypothesis.

Alexander (1961) developed the filter rule methodology and initially found that stock price changes were dependent and allowed abnormal profits to be made. Fama (1965) observed that any dependence that might exist in stock price series was not strong enough to be capable of being used to increase the expected profits of the trader. Many other studies, broadly similar to Fama's, that examined the short horizon returns, like Fisher (1966), Lo and MacKinlay (1988), and Conrad and Kaul (1988) found suggestive evidence that daily, weekly, and monthly returns are predictable from past returns. However, at least for individual securities, the variations in expected returns were not substantial enough to significantly dent the efficiency hypothesis. Shiller (1984) and Summers (1986) created a momentum for a debate on the reliability of the 'close to zero(0) autocorrelations of short horizon returns' which were the basic evidence in favour of efficiency till then. They argued that the tests missed the inefficiency and gave spurious and unreliable conclusions in favour of efficiency. Lot of studies then gave both sides of evidence on this issue.

De Bondt and Thaler (1985), Poterba and Summers (1988), Jagadeesh and Titman (1993), T.P. Madhusoodanan (1995,1998), and many others gave psychological descriptions of irrational bubbles, over and under reaction, contrarian strategies, return reversal v/s return persistence, and mean reversion possibilities-which would go against, or at least dilute the efficiency hypothesis. At the same time Fama and French (1988b), and many others argued that these anomalies can be explained within the broader framework of efficiency; with some fine-tunings in the models and the data. Event studies have produced useful evidence on how stock prices respond to information contained in an event relating to a particular scrip. Many studies focused on returns in a short window (a few days) around a clearly dated event. Event studies are the cleanest evidence we have on efficiency and Keith B. Johnson (1966); Fama, Fisher, Jensen and Roll (FFJR 1969); Jinho

Byun and Michael Rozeff (2003) have demonstrated ample evidence in support, using largely the stock split announcement events. W.H. Hausman, R.R. West and J.A. Largay (1972) studied the relationship between splits and stock price behaviour over different time periods. Their empirical results suggested that much of the price change associated with a split actually occurs before, rather than after the announcement becomes public.

This finding implied that the impending announcement of a stock split typically "leaks" to some people in the period preceding the board meeting at which the decision is formalized. Further, some studies like the ones by S. Basu (1977), Aswath Damodaran (1993), Chowdhury, Sadique and Akhter (2002) found slow/lagged or incomplete adjustment for information becoming available, thus indicating inefficiency in the market. On the strong form of efficiency, the utility of private or special information possessed by certain individuals has been examined. Michael C. Jansen (1968) found that mutual funds were on average not able to predict security prices well enough to outperform a buy-and-hold policy, and that there was very little evidence that any individual fund was able to do significantly better than what could be expected from mere random chance. Jaffrey F. Jaffe (1974) found no strength in the logic that private or special information is useful. However, Joseph E. Finnerty (1976) found that insiders could outperform the market using the special information possessed. This finding tended to refute the strong form of the EMH. Similar conclusions were given by Dan Givoly and Dan Palmon (1985). Infact, the more sensible version of the efficiency hypothesis would say that, since cost of information is an important factor, prices reflect information to a point where the marginal benefits of acting on the information (i.e. the profits to be made) do not exceed the marginal costs.

In one of the first significant studies conducted in India, O.P. Gupta (1985) used runs test and serial correlation test on weekly datasets of 39 shares for a 5-year period to find support for the independence assumption of the random walk model. I.M. Pande and Ramesh Bhat (1988) found that the experts as well as the capital markets participants in India believe that the market is excessively speculative and inefficient. Thus there was suggestive evidence that anomalies and inefficiencies prevailed in the market as per the belief of key players. S.K. Chaudhuri (1991) used daily price quotations of 93 actively traded shares for the period January 1988 to April 1990 to examine the serial independence of share price changes in Indian market. He found positive correlation but the magnitude of correlation coefficient was small.

R. Vaidyanathan & Kanti Kr. Gali (1994) tested the weak form of efficiency using three tests, namely the runs tests, serial correlation test and the filter rule test using daily data, and all the three tests supported EMH. On the other side, T.P. Madhusoodanan (1995, 1998) tested the over-reaction hypothesis and found that the strategy of purchasing loser shares and short selling winner shares would be able to generate an excellent arbitrage return in the Indian case. He further found the mean reverting tendencies of share prices in the Indian stock. J.C. Sharma (2002) rejected the assumption of efficiency in both the pre and post liberalisation return series in the Indian Stock Markets. His study also revealed a very strong predictive power of negative autocorrelations for future return, as indicated by the mean reverting tendencies. In the context of strong form efficiency, M.M. Goyal (1992) found that recommendations and special information of even a good investment magazine failed to decisively beat the market, whereas N.S. Malik (2006) found that insiders, probably because of their access to privileged information, can outperform the market in their stock selections.

Concluding Remarks

Thus, it is seen from a review of literature that the market efficiency issue is yet to be definitely settled. There is a plethora of evidence on either side of the efficiency. There are ever-growing dimensions of further research in this field and more coherent explanations need to be developed about various aspects of share price behaviour and return predictability. Continued testing is imperative before definite conclusions can be drawn on either side of efficiency.

References

Alexander, S. S., 1961, "Price Movements in Speculative Markets: Trends or Random Walks", *Industrial Management Review* II, May, 7-26.

Bachelier, L. J. B. A., 1900, "Theorie de la speculation", *Annales Scientifiques de l' Ecole Normale Superiente*, 3, No.1018 Paris: Gauthier- Villars. Translated in *The Random Character of Stock Market Prices*, edited by Paul H. Cootner. M.I.T. Press. Cambidge 1964.

Barberis, N., Shleilfer, A. and Vishny, R., 1996, "A Model of Investor Sentiment", *Journal of Financial Economics* 49, 307-343.

Basu, S., 1977, "Investment Performance of Common Stocks in Relation to their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis", *The Journal of Finance*, June 1977, Vol. XXXII, No.3, 663-681.

Bombay Stock Exchange Website; *www.bseindia.com*

Byun, Jinho and Rozeff, Michael S., 2003, "Long-run Performance after Stock Splits: 1927 to 1996", *The Journal of Finance*, Vol. LVIII, No. 3, 1063-1085

Chaudhuri, S. K., 1991a, "Short-run Share Price Behaviour: New Evidences on Weak Form of Market Efficiency", *Vikalpa*, Vol. 16, No. 4, 17-21.

Chaudhuri, S. K., 1991b, "Seasonality in Share Returns: Preliminary Evidences on Day-of-the-Week Effect", *Chartered Accountant*, November, Vol. 40, No. 4, 407.

Chowdhury, S.S.H., Sadique, M.S. and Akhter, M.S., 2002, "The Size Effect on the Speed of Stock Price Adjustment to Information in the Indian Stock Market", *Asian Economic Review*, 111-123.

Conrad, J. and Kaul, G., 1988, "Time-Variance in Expected Returns", *Journal of Business*, 61(4), 409-425.

Cootner, Paul H., ed., 1964, *The Random Character of Stock- Market Prices*, Cambridge, Massachusetts, The M.I.T. Press.

Damodaran, Aswath, 1993, "A Simple Measure of Price Adjustment Coefficients", *The Journal of Finance*, March, Vol. XLVIII, No. 1, 387-400.

Daniel, Kent, Hirshleifer, David, and Subrahmanyam, Avanidhar, 1997, "A Theory of Overconfidence, Self-attribution, and Security Market Under-and Over Reactions", *Unpublished Working Paper*, University of Michigan.

DeBondt, Werner F.M. and Thaler, Richard H., 1985, "Does the Stock Market Overreact?" *The Journal of Finance,* July, Vol-XL, No. 3, 793-805.

Edwards, Sebastian, Biscarri J.G. and Gracia F.P., "Stock Market Cycles, Financial Liberalisation and Volatility", published in *www.nber.org*.

Fama, Eugene F. and French, Kenneth R., 1988(a), "Permanent and Temporary Components of Stock Prices", *Journal of Political Economy*, Vol. 96, No.2, 246-273

Fama, Eugene F. and French, Kenneth R., 1988(b), "Dividends Yields and Expected Stock Returns", *The Journal of Financial Economics*, 22, 3-25

Fama, Eugene F., 1965, "The Behaviour of Stock-Market Prices", *The Journal of Business*, January, Vol. XXXVIII, 34-105.

Fama, Eugene F., 1970, "Efficient Capital Markets: A Review of Theory and Empirical Work", *The Journal of Finance*, May, Vol. 25, 383-417.

Fama, Eugene F., 1991, "Efficient Capital Market: II", *The Journal of Finance*, December, Vol. 46(5), 1575-1617.

Fama, Eugene F., Fisher, Lawrence, Jensen, Michael C., and Roll, Richard, 1969, "The Adjustment of Stock Prices to New Information", *International Economic Review*, Vol. 10, No. 1, 1-21.

Finnerty, Joseph E., 1976 b, "Insiders and Market Efficiency", *The Journal of Finance,* Vol-XXXI, No-4, September 1976, 1141-1148

Fisher, Lawrence, 1996, "Some New Stock Market Indexes", *Journal of Business*, 39(2), 191-225.

Fogler, H. Russell, 1978, *Analyzing the Stock Market: Statistical Evidence and Methodology*, Grid Inc., Columbus, Ohio.

Givoly, Dan and Palmon, Dan, 1985, "Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence", *The Journal of Business* 58(January), 69-87.

Goyal, M.M.,1992, "Security Returns in an Inefficient Market", *Indian Journal of Finance and Research*, July 1992, Vol. 2, No. 2, 61-67.

Graham, Benjamin, 1959, *The Intelligent Investor*, Harper and Row Brothers Publishing, New York.

Granger, Clive W. J. and Morgenstern, Oskar, 1963, "Spectral Analysis of New York Stock Market Prices", *Kyklos*, XVI, January, 1-27.

Gupta, L.C., 1992, *Stock Exchange Trading in India: Agenda for Reform*, Society for Capital Market Research and Development, Delhi.

Gupta, O. P., ed, 1989, *Stock Market Efficiency and Price Behaviour: The Indian Experience*, Anmol Publication, N. Delhi.

Gupta, O.P., 1985, *Behaviour of Share Prices in India- a Test of Market Efficiency*, National Publishing House, New Delhi.

Hausman, W. H., West, R.R. and Largay J. A., 1972, "Stock Splits, Price Changes, and Trading Profits: A Synthesis", *The Journal of Business*, 69-77.

Jaffe, Jeffrey F., 1974, "Special Information and Insider Trading", *The Journal of Business*, July, 410-428.

Jegadeesh, Narasimhan and Titman, Sheridan, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency", *The Journal of Finance*, March, Vol. XLVIII, No. 1, 65-91.

Jensen, Michael C., 1968, "The performance of Mutual Funds in the Period 1945-1964", *The Journal of Finance*, 389-416.

Johnson, Keith B., 1966, "Stock Splits and Price Change", *The Journal of Finance*, December, Vol. XXI, 675-686.

Keane, Simon M., 1983, *Stock Market Efficiency: Theory, Evidence and Implications*, Heritage Publishers.

Keim, Donald B., and Stambaugh, Robert F., 1984, "A Further Investigation of the Weekend Effect in Stock Returns", *Journal of Finance*.

Kendall, M. G., 1953, "The Analysis of Economics Time Series", *Journal of the Royal Statistical Society* (Series A), XCVI, 11-25.

Laeven, Luc, 2003, "Does Financial Liberalisation Reduce Financing Constraints?", *Financial Management,* Spring, Vol. 32, Issue-1, 16-20.

Lo, A. and Mackinlay, C., 1988, "Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test", *Review of Financial Studies* 1, 41-66.

Ma, Shiguang, 2004, *The Efficiency of China's Stock Market*, Ashgate Publishing Ltd., England.

Madhusoodanan, T. P., 1995, "Overreaction Hypothesis and Winner-Loser Effect in Indian Stock Market Returns", *Indian Journal of Finance and Research*, July, Vol. VII, No. 2, 1-10.

Madhusoodanan, T. P., 1998, "Persistence in the Indian Stock Market Returns: An Application of Variance Ratio Test", *Vikalpa,* Vol. 23, No. 4, 61-66.

Mahapatra, R. P., 1995, "Relative Strength in Performance of Share Prices in India: A Weak Form Test of Capital Market Efficiency", *Decision*, 22(3), 177-185.

Malik, N S, 2006, "Active Portfolio Management: A Study of Country Funds of Developed and Emerging Markets of the World", cited in Indian Stock Market: An Empirical Study, ed. By O. P. Gupta et al

Mandelbrot, Benito, 1966, "Forecast of Future Prices, Unbiased Markets and Martingale Models", *Journal of Business*, 39, Special Supplement (January), 242-255.

National Stock Exchange Website; *www.nse-india.com*

Pandey, I.M., and Bhat, Ramesh 1987, "Efficient Market Hypothesis: Understanding and Accepting in India, *Working Paper* No. 691, July-September, Indian Institute of Management, Ahmedabad.

Poterba, James M. and Summers, Lawrence H., 1988, "Mean Reversion in Stock Prices", *The Journal of Financial Economics*, 22, 27-59.

Poterba, James M. and Summers, Lawrence H.,1986, "The Persistence of Volatility and Stock Market Fluctuations", *American Economic Review*, Vol 76 ,No-5, 1142-1151

Rao, Krishna N and Mukherjee, K., 1971, "Random-Walk Hypothesis: An Empirical Study", *Arthaniti,* Vol. 14, No. 1&2, 53-60

Ray, D 1976, "Analysis of Security Prices in India", *Sankhya*, Vol.38, series C, part 4, pp. 149-164

Reserve Bank of India Website; *www.rbi.org.in*

Roberts, H., 1959, "Stock-Market 'Patterns' and Financial Analysis: Methodological Suggestions", *Journal of Finance*, 14.1-10.

Samuelson, Paul A., 1965, "Proof That Properly Anticipated Prices Fluctuate Randomly", *Industrial Management Review*, 6, Spring, 41-49.

Securities Exchange Board of India Website; *www.sebi.gov.in*

Seth, A. K., and Gupta, Saloni, 2005, "Understanding Volatility at BSE: A Quality Control Approach (Implications for Investors), *Decision*, Vol. 32, No.1, Jan-June.

Sharma, J.C., 2002, "Do Indian Stock Prices Follow Random Walk? An Enquiry", *Asian Economic Review*, 86-102.

Sharma, J.L. and Kennedy, E., 1977, "A Comparative Analysis of Stock Price Behaviour on the Bombay, London, and New York Stock Exchanges", *Journal of Financial and Quantitative Analysis*, September

Shiller, Robert J., 1981, "The Use of Volatility Measures in Assessing Market Efficiency", *The Journal of Finance*, May, Vol. XXXVI, No.2, 291-310.

Summers, Lawrence H., 1986, "Does the Stock Market Rationally Reflect Fundamental Values?", *The Journal of Finance*, July, Vol.41, No.3, 591-601

Vaidynathan,R. and Gali, Kantikumar, 1994, "Efficiency of the Indian Capital Market", *Indian Journal of Finance and Research* Vol V, No.-2, 27-40.