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"AN ANALYSIS OF WEAK FORM OF MARKET EFFICIENT THEORY OF THE INDIAN CAPITAL MARKET FOR THE PERIOD 2004 - 2008"

A PROJECT REPORT

submitted by

P. RAJESH KUMAR
Reg. No. 0720400028

In partial fulfillment of the requirements
for the award of the degree

of

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KCT Business School
Department of Management Studies
Kumaraguru College of Technology
(An autonomous institution affiliated to Anna University, Coimbatore)
Coimbatore-641 006

CoimbatoreCapital

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28.04.2009

CERTIFICATE

This is to certify that **Mr Rajesh Kumar**, student of K C T Business School undertook the project in our Organisation during the period from January 2009 to April 2009.

During this period his performance and conduct was good.

For Coimbatore Capital Limited

Manoharan D
Head - HR

Coimbatore Capital Limited
Regd. Office : Stock Exchange Building, 1st Floor, 686, Trichy Road, Coimbatore - 641 005. Tel : (0422) 232 02 02 - 06 Fax : 232 02 11
Website : www.coimbatorecapital.com E-mail : ccap@coimbatorecapital.net

KCT Business School

Department of Management Studies

Kumaraguru College of Technology

(An autonomous institution affiliated to Anna University, Coimbatore)

Coimbatore-641 006

BONAFIDE CERTIFICATE

Certified that this project titled "AN ANALYSIS OF WEAK FORM OF MARKET EFFICIENT THEORY OF THE INDIAN CAPITAL MARKET FOR THE PERIOD 2004 - 2008" is a bonafide work of **Mr. P. RAJESH KUMAR** who carried out this project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not from part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Director **Faculty Guide**

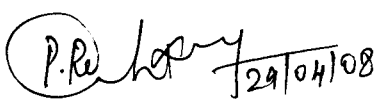
Evaluated and viva-voce conducted on 5/5/09

Examiner I 5.5.09. **Examiner II** 5/5/09

KCT BUSINESS SCHOOL
KUMARAGURU COLLEGE OF TECHNOLOGY
COIMBATORE - 641 006

DECLARATION

I hereby declare that the dissertation entitled "A TEST FOR WEAK FORM OF MARKET EFFICIENT THEORY OF THE INDIAN CAPITAL MARKET – BSE 500 INDEX FOR THE YEAR 2004 - 2008" submitted for the MASTER OF BUSINESS ADMINISTRATION degree is my original work and the dissertation has not formed the basis for the reward of any Degree, Associateship, Fellowship or any other similar titles.



Signature of the student

With Date

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ABSTRACT

The capital market is the market for securities, where companies and governments can raise long term funds. It is a market in which money is lent for periods longer than a year. The capital market includes the stock market that deals with the secondary market and financial instruments.

The capital markets consist of the primary market and the secondary market. The primary markets are where new stock and bonds issues are sold to investors. The secondary markets are where existing securities are sold and bought from one investor to another, in an exchange.

The efficient market hypothesis is related to the random walk theory. The idea that asset prices may follow a random walk pattern was introduced by Bachelier in 1900 (Poshakwale 1996). The random walk hypothesis is used to explain the successive price changes which are independent of each other. Fama (1991) classifies market efficiency into three forms - weak, semi-strong and strong.

In its weak form of efficiency, equity returns are not serially correlated and have a constant mean. If market is weak form efficient, current prices fully reflect all information contained in the historical prices of the asset and a trading rule based on the past prices can not be developed to identify miss-priced assets.

Market is semi-strong efficient if stock prices reflect any new publicly available information instantaneously. There are no undervalued or overvalued securities and thus, trading rules are incapable of producing superior returns. When new information is released, it is fully incorporated into the price rather speedily.

The strong form efficiency suggests that security prices reflect all available information, even private information. Insiders profit from trading on information not already incorporated into prices. Hence the strong form does not hold in a world with an uneven playing field.

The main objective of this study is to test the weak form efficiency of the Indian Capital Markets. The data or variables are the index price for the period of five years of BSE 500 index. Run test is used to find any influence of the past share prices over the present share prices. T – Test also used to identify whether there is any difference between the positive and negative runs by constructing frequency table.

Using the collected data the return was first calculated. For the first four years the return was positive and the market shows good signs, but in last year the market shows high negative returns. Run test indicates that there is a significant influence of the past share prices over the present share prices. There is no relation between successive returns. Only staggered period have high relevance over weak form of efficiency. Weak form of market efficiency is time dependant. It is not consistent over long period but it is consistent only in short period. T – Test indicates that there is a difference between the positive and negative runs. Positive runs are dominated by Real Investors and negative runs are dominated by Speculators.

Real Investors would watch the market and the company carefully and based on that they make their investments. Because of this only, the positive runs are higher than the negative runs.

But, the speculators will sell the shares once the price will start to creeps down. This is being done by them to escape from the risk factor. Because of this the negative runs are ended shortly.

Thus, this study gives a clear view about the weak form of efficiency of Indian Capital Markets.

INTRODUCTION

About the Study

The primary capital market is the market, where companies and governments can raise long term funds. It is a market in which money is invested for longer periods. The Secondary capital market is the stock market.

The capital markets consist of the primary market and the secondary market. The primary markets are where new stock and bonds issues are sold (underwriting) to investors. The secondary markets are where existing securities are sold and bought from one investor or speculator to another.

The reform process in India began in early 1991. Reform process started with stock exchanges and then spread to banks, mutual funds, Non Banking Finance Companies and of late, to insurance sector. However, reforms in equity market in particular commenced in mid-1980s. Bombay Stock Exchange (BSE) has always played the dominant role in the equity market in India. Traditionally, stock exchanges were governed by brokers leading to conflict of interest situation between the interest of common investors and those of brokers or owners of stock exchanges. With the establishment of National Stock Exchange (NSE), a new institutional structure was introduced in India that could ensure smooth functioning of market through a combination of new technology and efficient market design. The Securities Exchange Board of India (SEBI) was set up as a market regulator with statutory powers to control and supervise operations of all participants in the capital market through stock exchanges, stock brokers, mutual funds and rating agencies. The development of debt market is another significant development, which has been facilitated by deregulation of administered interest rates. Opening of stock exchange trading to Foreign Institutional Investors (FIIs) and permission of raising funds from international market through equity linked instruments have introduced a degree of competition to domestic exchanges and other market participants. Operations of FIIs have facilitated introduction of best practices and research inputs in trading and risk management systems. Bombay stock exchange (BSE), the premier stock

exchange of India is probably the oldest stock exchanges in Asia, established in 1875. It was initially named as "Native Share and Share Broker Association". Stability in prices for the BSE was considered to be an important feature. During the period 1987 tc 1994, average annual price fluctuations of ordinary shares on BSE were 25.1% as compared with London Stock Exchange (22%), and the New York Stock Exchange (23.9%).

Studies on Market Efficiency

The efficient market hypothesis is related to the random walk theory. The idea that asset prices may follow a random walk pattern was introduced by Bachelier in 1900. The random walk hypothesis is used to explain the successive price changes which are independent of each other. Fama (1991) classifies market efficiency into three forms - weak, semi-strong and strong.

Studies testing market efficiency in emerging markets are few. Poshakwale (1996) showed that Indian stock market was weak form inefficient; he used daily BSE index data for the period 1987 to 1994. Barua (1987), Chan, Gup and Pan (1997) observed that the major Asian markets were weak form inefficient. Similar results were found by Dickinson and Muragu (1994) for Nairobi stock market; Cheung et al (1993) for Korea and Taiwan; and Ho and Cheung (1994) for Asian markets. On the other hand, Barnes, (1986) showed a high degree of efficiency in Kuala Lumpur market. Groenewold and Kang (1993) found Australian market semi-strong form efficient. Some of the recent studies, testing the random walk hypothesis (in effect testing for weak form efficiency in the markets) are; Korea (Ryoo and Smith, 2002; this study uses a variance ratio test and find the market to follow a random walk process if the price limits are relaxed during the period March 1988 to Dec 1988), China, (lee et al 2001; find that volatility is highly persistent and is predictable, authors use GARCH and EGARCH models in this study), Hong Kong (Cheung and Coutts 2001; authors use a variance ratio test in this study and find that Hang Seng index on the Hong Kong stock exchange follow a random walk), Slovenia (Dezlan, 2000), Spain (Regulez

and Zarraga, 2002), Czech Republic (Hajek, 2002), Turkey (Buguk and Brorsen, 2003), Africa (Smith et al. 2002; Appiah-kusi and Menyah, 2003) and the Middle East (Abraham et al. 2002; this study uses variance ratio test and the runs test to test for random walk for the period 1992 to 1998 and find that these markets are not efficient).

The Efficient Market Hypothesis (EMH)

The efficient market hypothesis (EMH) is concerned with the informational efficiency of the capita1 markets. Based on the type of information that is fully reflected in the security prices, three forms of EMH have been propounded, namely the weak, the semi-strong and the strong.

In the weak form of efficiency, security prices fully reflect the information content of past prices. In the semi-strong form all public information and in the strong formal information. Whether public or private, respectively is fully reflected in the security prices. When the market is efficient with respect to an information set, it means that no one can consistently make abnormal profits using only that information set. Here, abnormal profits refer to the profits earned in excess of the profits from a naive buy-and-hold strategy.

However, on particular occasions, due to chance, it may be possible for some to gain profits higher than from a naive buy-and-hold strategy. What the EMH says is that no one can consistently make higher profits by trading than by following a naive buy-and-hold strategy.

About the Industry

Micro analysis

Testing Random Walk Hypothesis for Indian Stock Market Indices

The concept of 'efficient' stock market has been seriously debated ever since Eugene Fama first introduced it around thirty-five years ago. Under the weak form of market efficiency, the price of a security reflects all the available information about the economy, the market and the specific security, and that prices adjust immediately to new information. For a long time the conformation of random walk is considered to be a sufficient condition for market efficiency. However, rejection of random walk model does not necessarily imply the inefficiency of stock-price formation. Random Walk is the path of a variable over time that exhibits no predictable patterns at all. The random walk hypothesis (RWH) states that the present market price is the best indicator of the future market prices with an error term that is stochastic in nature.

In an efficient market it is not possible to make profit based on the past information hence the prediction of future price conditional on the past prices on an average should be zero. The more efficient a market is the more random and unpredictable the market returns would be. In the most efficient market the future prices will be totally random and the prices formation can be assumed to be a stochastic process with mean in price change equal to zero.

The random walk hypothesis for daily and weekly market indices returns are rejected for Indian context using heteroscedasticity corrected variance ratio test. There are significant first order autocorrelation in daily returns, which are in general absent in weekly returns. Autocorrelation if present is significant at lag one & two and it tends to die out for higher lags. Heteroscedasticity is not a source of nonrandom behavior of the indices. The problem of changing variances is restricted to daily data for BSE-100.

The results confirm the mean reverting behavior of stock indices and overreaction of stock prices in unitary direction in India. This provides an opportunity to the traders for predicting the future prices and earning abnormal profits.

Weak Form of Efficiency in Indian Stock Markets

In the last three decades, a large number of countries had initiated reform process to open up their economies. These are broadly considered as emerging economies. Emerging markets have received huge inflows of capital in the recent past and became viable alternative for investors seeking international diversification. Among the emerging markets India has received it' s more than fair share of foreign investment inflows since its reform process began. One reason could be the Asian crisis which affected the fast developing Asian economies of the time (also some times collectively called „tiger economies"). India was not affected by the Asian crisis and has maintained its high economic growth during the period.

Today India is one of the fastest growing emerging economies in the world. The reform process in India officially started in 1991. As a result, demand for investment funds is growing significantly and capital market growth is expected to play an increasingly important role in the process. The capital market reforms in India present a case where a judicious combination of competition, deregulation and regulation has led to sustained reforms and increased efficiency.

At this transitional stage, it is necessary to assess the level of efficiency of the Indian equity market in order to establish its longer term role in the process of economic development. However, studies on market efficiency of Indian markets are very few. They are also dated and mostly inconclusive. The objective of this study is to test whether the Indian equity markets are weak form efficient or not. EMH, similar to other theories that require future expected prices or returns, use past actual prices or returns for the tests. Sets of share price changes are tested for serial independence. Random walk theory for equity prices show an equities market in which new information is quickly discounted into prices and abnormal or excess returns can not be made from observing past prices.

This paper examines the weak form efficiency in two of the Indian stock exchanges which represent the majority of the equity market in India. We

employ three different tests ADF, PP and the KPSS tests and find similar results. The results of these tests find that these markets are not weak form efficient. These results support the common notion that the equity markets in the emerging economies are not efficient and to some degree can also explain the less optimal allocation of portfolios into these markets. Since the results of the two tests are contradictory, it is difficult to draw conclusions for practical implications or for policy from the study.

It is important to note that the BSE moved to a system of rolling settlement with effect from 2nd July 2006 from the previously used Badla system. The Badla system was a complex system of forward settlement which was not transparent and was not accessible to many market participants. The results of the NSE are similar (NSE had a cash settlement system from the beginning) to BSE suggesting that the changes in settlement system may not significantly impact the results. On the contrary a conflicting viewpoint is that the results of these markets may have been influenced by volatility spillovers, as such the results may be significantly different if the changes in the settlement system are incorporated in the analysis. The research in the area of volatility spillover has argued that the volatility is transferred across markets as such the results of these markets may be interpreted cautiously.

Macro analysis

Capital Market Efficiency

An Analysis of Weak-form Efficiency on the Ghana Stock Exchange

One of the main research branches in financial economics relates to the area of market efficiency. It investigated the issue of weak-form efficiency on the Ghana Stock Exchange. Two main analytical models: the RW and GARCH(1,1) models have been employed to test for significant random walks in daily market returns. A battery of five complementary statistical tests was also applied to the residuals of the estimated models to verify for serial independence.

The findings indicates that the Ghana Stock Exchange is weakly inefficient. The results from the RW and GARCH models unanimously reject the presence of random walks in the DSI daily market returns. Furthermore, the tests for nonlinearity proved on the strength of the McLeod-Li and BDS test that the residuals of the market returns do not follow a random walk generating process.

The absence of random walks infers distortions in asset pricing and risk, a mark of market inefficiency. The implication here is that one should expect a sizeable amount of stock prices on the GSE to be either undervalued or overvalued. It is therefore not a waste of time for interested experts to analyze GSE stocks by looking for those that are undervalued. There is a chance for a hardworking analyst to consistently outperform the market averages. People such as corporate officers who have inside information can do better than the market averages, and individuals and organizations that are especially good at digging out information on small, new companies are likely to consistently do so well.

Investigation also done in the short run dynamic inter linkages between the US and Indian stock markets, using daytime and overnight returns of NSE Nifty and NASDAQ Composite from 1st July 1999 to 30th June 2001. This approach provides an explicit, empirically based; quantitative description of the way information propagates from NASDAQ and is being incorporated by

NSE overnight returns. The research employs Two- stage GARCH model and a simple univariate ARMA-GARCH model to capture the mechanism by which NASDAQ Composite daytime returns and volatility have an impact on not only the conditional returns but also on the conditional volatility of Nifty overnight returns. We found that the simple ARMA-GARCH model performs better than the more complex Two Stage GARCH model suggested in the literature. We also benchmark the simple univariate model with a model involving information pertaining to only the domestic market and discarding the information revealed by NASDAQ.

The main findings are as follows: First, the granger causality results indicate unidirectional "granger causality" running from the US stock markets (both NASDAQ Composite and S & P 500) to Indian stock market, NSE Nifty index. Second, the previous day's daytime returns of both NASDAQ Composite and NSE Nifty have significant impact on the NSE Nifty overnight return of the following day. However, the volatility spillover effects are significant only from NASDAQ Composite implying that the conditional volatility of Nifty overnight returns is imported from US.

Also found that the effect of NASDAQ daytime return volatility shocks, on average, is 9.51% and that of Nifty daytime return volatility is a mere 0.5%. Turning to out of sample forecasts however, by including the information revealed by NASDAQ day trading provides better forecasts of mean levels of Nifty overnight returns but does not significantly improve the prediction of volatility.

At foremost interest in much of the empirical international financial literature is to study the extent to which markets have become internationally integrated. Insights into information flows in markets will increase the understanding of the relevant mechanisms at work during extreme situations such as market crashes, which in turn can provide guidelines for intervention and tax policies. The results contribute in a modest manner with reference to Indian stock market integration with the US stock market. The results reported are in contrast with the previous studies, which have examined the co-movement of Indian markets with other markets and suggested a very low

degree of correlation. Here there is strong evidence that NSE Nifty is in tune with NASDAQ Composite over the sample period. Various explanations can be offered for this phenomenon and these range from (i) Deregulation of Indian financial market since 1992, including increased efforts to implement liberalization measures. (ii) Increase in macro economic policy coordination, (iii) Expanding influence of multinational corporations, (iv) Increased participation of FIIs in Indian stock market. (v) Increasing international cross-listing of Indian firms in US markets and (vi) transmitted from one market to the other.

To capture the dynamic inter-linkages between the markets, which have non-overlapping trading hours, the literature largely applied a Two Stage GARCH model with intra-daily data that define overnight and daytime returns. Becker et al (1990) employ opening and closing data for Tokyo Stock Exchange (Nikkei) and New York Stock Exchange (S&P 500), from 1985 to 1988, to study the synchronization of stock price movements. Their simple regression analysis indicate that the US daytime performance greatly influences overnight returns in Japan the following day and the change in the TSE only has a marginal impact on the NYSE overnight returns on the same day.

About the company

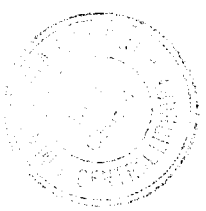
COIMBATORE CAPITAL LIMITED

INTRODUCTION AND DETAILS ABOUT THE ORGANIZATION

Coimbatore Capital Limited (C-Cap) was promoted by Mr. D Balasundaram, an industrialist and Director of K G Group of Companies along with few members of Coimbatore Stock Exchange (CSX). Mr. Balasundaram is also the former President & Founder Director of CSX. He is also a founder director of Interconnected Stock Exchange of India (ISE).

Coimbatore Capital is a trading member in the capital market, futures and options, and retail debt segments of the National Stock Exchange of India Limited. It is also a depository participant with National Securities Depository Limited. It is also a dealer in the over the counter exchange of India Limited. A subsidiary of Coimbatore Capital is a member of inter connected stock exchange of India Limited.

DETAILS OF THE COMPANY



Residental Adderss

Coimbatore Capital (P) Limited
Stock Exchange Building
1st Floor
686, Trichy Road
Coimbatore - 641 005
Phone: +91 422 2 32 02 02 - 06
For any queries send mails to: dp@coimbatorecapital.net

HISTORY OF THE COMPANY

Coimbatore Capital Limited (C-Cap) was promoted by Mr. D Balasundaram, an industrialist and Director of K G Group of Companies along with few members of Coimbatore Stock Exchange (CSX).

C-Cap commenced its operations as a Member in the Capital Market Segment of the National Stock Exchange of India Limited (NSE) in July 1995. C-Cap was admitted as a dealer of Over The Counter Exchange of India (OTCEI) during 1995 and commenced trading in March 1996.

The Company commenced its services as Depository Participant of National Securities Depository Limited (NSDL) in February, 1997. The company has become a trading & clearing member in the derivative segment of NSE in August 2000.

ACTIVITIES OF THE COMPANY

C-cap renders the following services to their clients directly or through their branches in big cities and major towns in Tamilnadu, Pondicherry, Kerala and Karnataka. The may provide the following services to their clients at a minimum amount of advisory charges compared to other brokers

i. Share trading
ii. Derivatives trading
iii. Depository Participant
iv. Commodities market trading operations
v. Mutual Fund Distributor and consultant
vi. Initial public offering
vii. Insurance and investment consultant

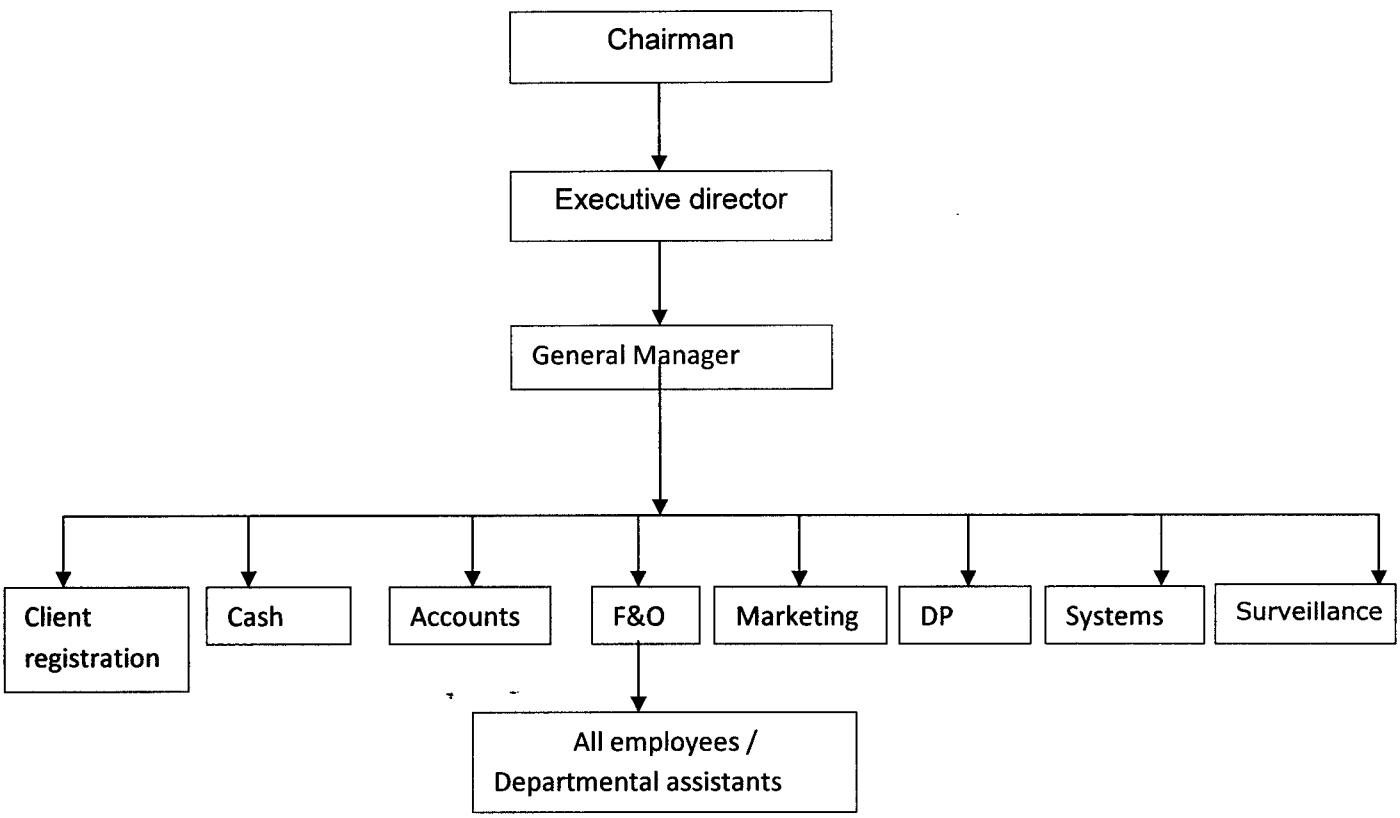
Branches and trading terminals

- Chennai
- Coimbatore
- Cochin
- Ernakulam
- Bangalore
- Dindigul
- Erode
- Gobichettiipalayam
- Karur
- Hosur
- Karaikal
- Madurai
- Neyveli
- Ooty
- Pondicherry
- Salem
- Sivakasi
- Thanjavur
- Tirunelveli
- Trichy
- Tuticorin
- Vellore
- Udumalpet
- Pollachi

MANAGEMENT STRUCTURE

The following chart illustrates the management structure of C-cap Limited.

ORGANISATIONAL STRUCTURE CHART



OBJECTIVES OF THE STUDY

To study the weak form of efficient market theory of the Indian Capital Market.

STATEMENT OF THE PROBLEM

Today nearly all the stock broking firms need a literature backup to educate their investors with the current happenings in the market. They also need a literature backup for themselves regarding the market efficiency. They need to update the developments frequently depending on the current market conditions.

SCOPE OF THE STUDY

This study helps to know about the market efficiency of Indian stock markets by the firm and in other way it helps to educate the investors who already prevail and also to the new investors.

LIMITATIONS

- This study only analyzes the weak form market efficiency.
- Only BSE 500 index prices are taken for the study.

METHODOLOGY

Type of study

This is purely an analytical study. The data are the index price for the period of five years of BSE 500 index. Tests like Run test and T – test are used to find the weak form of efficiency of the Indian capital market.

Sampling design

The samples are the daily price index of BSE 500 for the period of five years from January 2004 to December 2008. Because, in this period only the Indian Stock Market had a very high growth level. Though there are 5000 company shares traded in the stock market, BSE 500 shares are traded at 99% in the total trade activity. Therefore, BSE 500 index is selected for the research.

Method of data collection

The study purely relies on secondary data. The data are the index for a period of five years. Data are collected through websites and journals(referred in bibliography).

Tools for analysis

The accuracy of the research study is enhanced by the use of statistical tools. Researcher used Run test to find whether there is any influence of the past share prices over the present share prices and he also used T – test to identify whether there is any difference between the positive and negative runs by constructing frequency table.

REVIEW OF LITERATURE

Rakesh Gupta and Parikshit K. Basu (2007)[1], the researchers test the weak form efficiency in the framework of random walk hypothesis for the two major equity markets in India for the period 1991 to 2006. The evidence suggests that the series do not follow random walk model and there is an evidence of autocorrelation in both markets rejecting the weak form efficiency hypothesis. The researchers employed three different tests ADF, PP and the KPSS tests and find similar results. The results of these tests find that these markets are not weak form efficient. These results support the common notion that the equity markets in the emerging economies are not efficient and to some degree can also explain the less optimal allocation of portfolios into these markets. Since the results of the two tests are contradictory, it is difficult to draw conclusions for practical implications or for policy from the study.

R. Vaidyanathan and Kanti kumargali (1994)[2], the researchers tested the weak form efficiency of the Indian capital market. They tested for randomness using the runs test, serial correlation and filter rule tests based on the daily closing prices of ten shares actively traded on the Bombay Stock Exchange. The evidence from all the three tests supports the weak form of Efficient Market Hypothesis. However, with an unrealistic assumption of zero transaction cost, it may be possible to identify profitable opportunities for using filter rules provided the patterns are stable over time.

[1] Rakesh Gupta and Parikshit K. Basu, Weak Form Efficiency In Indian Stock Markets: International Business & Economics Research Journal; March 2007, Volume 6, No. 3

[2] R. Vaidyanathan and Kanti kumargali, Efficiency of the Indian Capital Market: Indian Journal of Finance and Research; July 1994, Volume 5, No. 2

Frimpong Joseph Magnus (2008)[3], the researcher examines the weak-form efficient market hypothesis (EMH) in the case of the Ghana Stock Exchange (GSE) a developing market. Daily returns from the Databank Stock Index (DSI) over a 5-year period 1999-2004 were used for the exercise. Random walk (RW) and GARCH(1,1) models are used as the basis for this analysis. The GSE DSI returns series exhibit volatility clustering, an indication of inefficiency on the GSE. The weak-form efficient market (random walk) hypothesis was rejected for the GSE, meaning that the market is inefficient. The inefficient market has important implications for investors, both domestic and international. Knowledge of profitable arbitrage opportunities due to market predictability serves to attract investors to diversify from more efficient markets to invest on the GSE bourse to increase their returns.

Elaine Y. L. Loh (2007)[4], the researcher proposes a test for weak form efficiency based on the practitioner's approach to technical analysis. The practitioner's approach, on the other hand, typically involves the simultaneous use of trend indicators and other confirming indicators because trend indicators do not sufficiently capture the information content in past prices. By combining trend indicators with confirming indicators that are also based on the detection of trends in past prices, it is possible to construct a superior technical trading strategy that captures a more comprehensive aspect of predictability in past prices. Applying the technical trading rules to data on five Asian-Pacific stock markets, the evidence suggests that a test for weak form efficiency based solely on trend indicators is noisy and that the alternative test proposed in this study is significantly more effective in capturing the information content in past prices. An examination of weak form efficiency based on this alternative test suggests that weak form efficiency is determined by factors other than technological progress.

[3] Frimpong Joseph Magnus, Capital Market Efficiency: An Analysis of Weak-form Efficiency on the Ghana Stock Exchange: Journal of Money, Investment and Banking; Year 2008, ISSN 1450-288X Issue 5

[4] Elaine Y. L. Loh, An alternative test for weak form efficiency based on technical analysis: Applied Financial Economics; Year 2007, Volume 17, p1003 – 1012, 10p

Edgar J. Wilson and Hazem A. Marashdeh (2007)[5], the researchers responds to the unsatisfactory argument that there is no correspondence between co-integration and the efficient market hypothesis. The major contribution of this paper is the demonstration that the correction (in terms of growth rates) to long-run equilibrium allows systematic profits to be obtained in the short run. While this disequilibrium behavior describes short run market inefficiency, the consequent arbitrage activity moves the foreign exchange and stock markets to long-run equilibrium consistent with market efficiency in the long run. Market inefficiency in the short run (via equilibrating corrections) ensures market efficiency in the long run.

Xia oming li and Jian xu (2002)[6], the researchers studied the efficient market hypothesis using four New Zealand Stock Exchange indexes (NZSE 10, NZSE 30, NZSE 40, and NZSE SC) within the random walk, co integration and Granger causality test framework. The test results have shown that the small-firm stock market is semi strong form efficient to a certain degree. However, results concerning large firms are sensitive to the choice of index. The share market of the top ten companies only is not even weak-form efficient; while the share markets covering the top 30 and 40 large companies are weak-form efficient but not semi strong form efficient.

Manolis G. Kavussanos and Everton Dockery (2001)[7], in this paper the researchers introduces multivariate generalizations of the univariate Dickey-Fuller likelihood ratio tests to the class of Seemingly Unrelated; Regressions,: to investigate empirically the stock price efficiency of ASE. The method takes into account the contemporaneous correlation between stocks in the ASE, and avoids the sample biases which may result by considering only subsets of

[5] Edgar J. Wilson and Hazem A. Marashdeh, Are Co-integrated Stock Prices Consistent with the Efficient Market Hypothesis?, September 2007, THE ECONOMIC RECORD, Volume 83, SPECIAL ISSUE, p87–93, 7p

[6] Xia oming li and Jian xu, A note on New Zealand Stock Market efficiency: Applied Economics Letters; Year 2002, Volume 9, p879 – 883, 5p

[7] Manolis G. Kavussanos and Everton Dockery, A multivariate test for stock market efficiency: the case of ASE: Applied Financial Economics; Year 2001, Volume 11, p573 – 579, 7p

stocks listed in the exchange. Conclusively, the results confirm that the ASE is informationally inefficient, implying that past stock prices contain some information as to future price movements which investors may act on.

Vijaya Bhaskar Marisetty (2003)[8], the researcher in his test found that that it takes around nineteen days for the prices of a sample of stocks representing BSE and NSE exchanges, to adjust to their intrinsic values during 1996-2002. The stock prices overreact to the information before adjusting to their intrinsic values. The researcher also found that market-wide information adjusts faster than firm-specific information. A stock exchanges' efficiency can be measured by its liquidity and price discovery. An exchange that provides price discovery will have high liquidity. By measuring the speed of stock price adjustment to its intrinsic value with the arrival of new information we can understand price discovery process and productive efficiency of a stock exchange.

Graham Smith (2007)[9], the researcher classifies formal stock markets in the Middle East into two categories and discuses the principal characteristics of the five markets covered in this study, those in Israel, Jordan, Kuwait, Lebanon and Oman. The hypothesis that a stock market price index follows a random walk is investigated using the multiple variance ratio tests. The hypothesis is rejected in two of the markets, those for Kuwaiti domestic companies and Oman. For the Israeli, Jordanian and Lebanese markets, composite stock price indices follow a random walk and so these markets are weak-from efficient. The researcher discusses these results in the light of stock market characteristics.

[8] Vijaya Bhaskar Marisetty, Measuring productive efficiency of stock exchanges using price adjustment coefficients: The Journal of Finance, March 2003, Volume 42, p533-553, 21p

[9] Graham Smith, Random walks in Middle Eastern stock markets: Applied Financial Economics; Year 2007, Volume 17, p587 – 596, 10p

Philip B. Shane and Toby Stock (2006)[10], the researchers investigates the degree to which capital market participants anticipate and correctly interpret temporary income effects of tax-motivated income shifting. The researchers found evidence consistent with financial analysts' earnings forecasts failing to anticipate earnings management that shifts income from fourth quarters in higher tax rate years to immediately following first quarters of lower tax rate years. The evidence suggests that this failure is not the result of a decision to ignore the income shifting, but rather an inability to recognize temporary components of reported earnings. The researchers also found evidence that market prices do not fully reflect the temporary income effects of tax-motivated income shifting, and that analyst inefficiency explains about half of the market inefficiency. The researchers interpret these inefficiencies as potentially important costs of tax planning that could limit the ability of public firm managers to implement otherwise optimal tax strategies.

N. Mil Chakova (2005)[11], the researcher in his context gives reasons for changes in stock prices in emerging markets, it is, developed and developing countries can be arbitrarily called leader countries and follower countries. If a developing country copies some other country's economic model and shocks occur in the leader country that are capable of altering the institutional path chosen by the follower country, its stock market immediately reacts to these events by falling, since investors are uncertain about the political and economic future of the country and its reforms. While an established institutional environment could prevent the development of negative trends, the process of forming such an environment may take decades. The choice of another country's development path should be prevented by a national stock market model that will promote greater coordination of the actions of various countries' investors and expand opportunities for diversification of their portfolios and risk reduction.

[10] Philip B. Shane and Toby Stock, Security Analyst and Stock Market Efficiency in Anticipating Tax-Motivated Income Shifting: The Accounting Review; Year 2006, Volume 81, p227 – 250, 24p

[11] N. Mil Chakova, Stock Market Efficiency: Problems of Economic Transition; September 2005, Volume 48, Number 5, p60 – 77, 18p

A. Sabur Mollah (2007)[12], the researcher used Triangulation econometric approach to assess the predictability of daily return series of Botswana Stock Exchange (BSE) and to test the null hypothesis of random walk model. The final results reject the null hypothesis of random walk model for the daily return series of BSE for the period of 1989–2005 and evidenced serial autocorrelation of return series, which clearly indicate predictability and volatility of security prices of Botswana market. However, the empirical evidence of both non-parametric (Kolmogrov–Smirnov: normality test and run test) and parametric test (Auto-correlation test, Auto-regressive model, ARIMA model) reject the hypothesis of random walk model and indeed violate the notion of weak-form market efficiency.

Khelifa Mazouza and Xiafei Lib (2007)[13], the researchers tests the overreaction hypothesis using data from the UK stock market. The study covers a period of 30 years (from 1973 to 2002). The results initially seem to be consistent with the overreaction hypothesis and no obvious seasonal pattern can be identified. The results do not depend on whether buy-and-hold returns (BHR) or cumulative abnormal returns (CAR) used to compute the returns of the arbitrage portfolio. The overreaction phenomenon is still observable even after controlling for the size effect and the time-varying nature of risk.

[12] A. Sabur Mollah, Testing Weak-Form Market Efficiency in emerging market: Evidence from Botswana Stock Exchange: International Journal of Theoretical and Applied Finance; September 2007, Volume 10, Number 6, p1077 – 1094, 18p

[13] Khelifa Mazouza and Xiafei Lib, The overreaction hypothesis in the UK market: empirical analysis: Applied Financial Economics; Year 2007, Volume 17, p1101 – 1111, 12p

Dr. Vasileios Kallinterakis and Shikha Khurana (2008)[14], the researchers studied the trading dynamics in Indian capital markets on the premises of five indices (BSE30/BSE100/BSE200/S&P CNX500/NIFTY50) during the post-liberalization (1992-2008) period in order to gauge whether feedback traders there can be associated with the underlying volatility. The results indicate that while volatility remains significant throughout the period, feedback trading becomes depressed after 1999 and the researchers interpret these results in light of the evolutionary transformation of Indian capital markets during the post-1999 period. The relationship between feedback trading and volatility persistence has been well-documented in Finance with evidence largely in favour of their significant joint presence. This suggests that feedback traders are capable of bearing a destabilizing influence over securities' prices, an issue of key importance especially in the emerging markets' context due to those markets' incomplete regulatory frameworks and vulnerable structures.

A.K. Seth and Saloni Gupta (2005)[15], the researchers' use a quality control approach to study the volatility of common stock in India at the market level and devise a trading behavior at BSE. Considering "volatility" an important indicator of stock market efficiency and development, the average level of volatility is measured for the period 1980 to 2003. The data sample period, from Jan. 1, 1980 to Dec. 31, 2003, covers a wide range of political and economic events that may have influenced the economy and, hence, the stock market. Estimates of the standard deviation of monthly return in a year, daily return in a year and daily return in a month are made to have a complete idea of the level and nature of volatility. Further, the researchers also tried to study acceptable limits of volatility that may be embedded in the decision making of investors, depending on the type of investors.

[14] Dr. Vasileios Kallinterakis and Shikha Khurana, Volatility Persistence and the Feedback Trading Hypothesis: Evidence from Indian Markets: Journal of Finance; Year 2008, Volume 42, p557 – 581, 25p

[15] A.K. Seth and Saloni Gupta, Understanding Volatility at BSE : A Quality Control Approach: Journal of Finance; June 2005, Volume 32, Number 1, p252 – 282, 31p

Vikash Ramiah and Sinclair Davidson (2007)[16], the researchers in their study describe the interaction between noise traders and information traders. The researchers' didn't assume that information traders are error-free. Instead information traders make mistakes leading to under-reaction and over-reaction. Information traders may even add to pricing errors in the market. These interactions are captured in our information adjusted noise model. The researchers tested their model using data from the Australian Stock Exchange. This market has a continuous information disclosure regime that allows us to determine when information is released to the market. The researchers present evidence consistent with the notion that the market is often informationally inefficient.

[16] Vikash Ramiah and Sinclair Davidson, Information-Adjusted Noise Model: Evidence of Inefficiency on the Australian Stock Market: The Journal Of Behavioural Finance; June 2007, Volume 8, Number 4, p209 – 224, 16p

ANALYSIS & INTERPRETATION

The data related index is taken from January 2004 to December 2008 on trading days. The weekly return is calculated as,

Formula: $L_n (p_1/p_0)*100$ (FORMULA – 2.1 for calculating weekly returns)

The following table gives the weekly returns calculated for BSE 500.

TABLE – 1.1 showing the weekly returns for the YEAR 2004.

WEEK	RETURN (%)
1	1.15
2	(4.55)
3	(3.77)
4	(2.77)
5	0.52
6	4.57
7	(2.25)
8	(3.67)
9	4.15
10	(2.02)
11	(4.26)
12	0.75
13	5.77
14	1.19
15	2.09

16	1.63
17	(5.24)
18	0.94
19	(14.98)
20	(0.62)
21	(3.40)
22	(0.005)
23	(0.12)
24	(1.74)
25	(0.93)
26	3.80
27	0.17
28	1.69
29	2.64
30	1.55
31	0.74
32	(1.94)
33	(0.28)
34	1.85
35	2.25
36	1.84
37	3.12

38	0.29
39	2.46
40	2.46
41	(1.61)
42	(0.65)
43	0.32
44	3.91
45	1.15
46	0.45
47	1.82
48	4.22
49	(0.66)
50	2.67
51	2.67
52	1.87

TABLE – 1.2 showing the weekly returns for the YEAR 2005.

WEEK	RETURN (%)
1	(2.66)
2	(4.17)
3	(1.07)
4	3.91
5	3.94
6	1.19
7	(1.14)
8	0.06
9	3.92
10	0.48
11	(2.42)
12	(5.06)
13	3.26
14	(1.26)
15	(3.22)
16	0.97
17	(3.03)
18	3.39
19	1.12
20	0.25

21	2.74
22	0.97
23	0.44
24	0.08
25	2.43
26	0.52
27	0.78
28	1.59
29	2.74
30	0.95
31	2.84
32	0.49
33	0.66
34	(1.19)
35	2.89
36	1.76
37	3.68
38	(3.62)
39	4.44
40	(0.91)
41	(3.74)
42	(2.80)

43	(4.59)
44	4.49
45	4.98
46	2.24
47	1.57
48	1.91
49	1.29
50	1.85
51	(0.34)
52	1.54

TABLE – 1.3 showing the weekly returns for the YEAR 2006.

WEEK	RETURN (%)
1	3.16
2	(1.77)
3	1.11
4	2.86
5	(1.46)
6	3.21
7	(1.12)
8	1.29
9	3.59
10	1.76
11	0.62
12	1.02
13	3.09
14	2.84
15	(3.18)
16	5.75
17	(0.64)
18	4.58
19	(0.59)
20	(12.47)

21	(1.19)
22	(4.28)
23	(9.05)
24	(0.05)
25	5.72
26	1.18
27	(1.07)
28	0.94
29	(6.49)
30	5.94
31	1.62
32	4.19
33	2.74
34	1.00
35	1.31
36	1.99
37	0.62
38	1.25
39	2.17
40	0.40
41	2.03
42	(0.03)

43	1.83
44	1.62
45	1.32
46	0.32
47	2.45
48	1.05
49	(0.57)
50	(1.58)
51	(0.93)
52	2.70

TABLE – 1.4 showing the weekly returns for the YEAR 2007.

WEEK	RETURN (%)
1	0.77
2	1.13
3	1.26
4	0.72
5	0.71
6	0.16
7	(1.79)
8	(5.13)
9	(4.97)
10	(1.42)
11	(2.13)
12	5.73
13	(1.19)
14	(1.54)
15	4.39
16	3.34
17	0.45
18	1.19
19	(0.71)
20	3.85

21	0.81
22	1.71
23	(3.22)
24	0.83
25	2.49
26	1.81
27	1.72
28	2.52
29	1.37
30	(2.88)
31	(0.45)
32	(1.72)
33	(5.01)
34	0.87
35	6.43
36	2.24
37	0.86
38	5.96
39	3.90
40	2.29
41	2.98
42	(4.78)

43	9.84
44	3.84
45	(3.48)
46	5.03
47	(4.15)
48	3.37
49	4.39
50	2.06
51	(4.82)
52	6.09

TABLE – 1.5 showing the weekly returns for the YEAR 2008.

WEEK	RETURN (%)
1	4.07
2	(2.60)
3	(7.85)
4	(6.75)
5	(2.04)
6	(3.55)
7	2.65
8	(3.36)
9	1.57
10	(11.2)
11	(1.49)
12	(6.74)
13	8.87
14	(5.63)
15	3.70
16	4.40
17	3.59
18	2.84
19	(4.94)
20	3.59

21	(3.75)
22	(2.56)
23	(5.81)
24	(2.40)
25	(3.71)
26	(6.85)
27	(3.90)
28	1.25
29	(0.44)
30	5.68
31	2.41
32	3.53
33	(2.42)
34	(2.40)
35	1.09
36	(0.29)
37	(3.36)
38	(1.74)
39	(6.29)
40	(4.90)
41	(19.27)
42	(4.23)

43	(14.65)
44	9.15
45	3.31
46	(5.45)
47	(6.87)
48	1.02
49	(0.51)
50	7.00
51	5.47
52	(6.81)

Table - 1.6 showing the grouping of weeks against year.

Weeks	Year 2004	Year 2005	Year 2006	Year 2007	Year 2008
1	1.15	(2.66)	3.16	0.77	4.07
2	(4.55)	(4.17)	(1.77)	1.13	(2.6)
3	(3.77)	(1.07)	1.11	1.26	(7.85)
4	(2.77)	3.91	2.86	0.72	(6.75)
5	0.52	3.94	(1.46)	0.71	(2.04)
6	4.57	1.19	3.21	0.16	(3.55)
7	(2.25)	(1.14)	(1.12)	(1.79)	2.65
8	(3.67)	0.06	1.29	(5.13)	(3.36)
9	4.15	3.92	3.59	(4.97)	1.57
10	(2.02)	0.48	1.76	(1.42)	(11.2)
11	(4.26)	(2.42)	0.62	(2.13)	(1.49)
12	0.75	(5.06)	1.02	5.73	(6.74)
13	5.77	3.26	3.09	(1.19)	8.87
14	1.19	(1.26)	2.84	(1.54)	(5.63)
15	2.09	(3.22)	(3.18)	4.39	3.7
16	1.63	0.97	5.75	3.34	4.4
17	(5.24)	(3.03)	(0.64)	0.45	3.59
18	0.94	3.39	4.58	1.19	2.84
19	(14.98)	1.12	(0.59)	(0.71)	(4.94)
20	(0.62)	0.25	(12.47)	3.85	3.59
21	(3.4)	2.74	(1.19)	0.81	(3.75)
22	(0.005)	0.97	(4.28)	1.71	(2.56)
23	(0.12)	0.44	(9.05)	(3.22)	(5.81)
24	(1.74)	0.08	(0.05)	0.83	(2.4)
25	(0.93)	2.43	5.72	2.49	(3.71)
26	3.8	0.52	1.18	1.81	(6.85)
27	0.17	0.78	(1.07)	1.72	(3.9)
28	1.69	1.59	0.94	2.52	1.25

29	2.64	2.74	(6.49)	1.37	(0.44)
30	1.55	0.95	5.94	(2.88)	5.68
31	0.74	2.84	1.62	(0.45)	2.41
32	(1.94)	0.49	4.19	(1.72)	3.53
33	(0.28)	0.66	2.74	(5.01)	(2.42)
34	1.85	(1.19)	1	0.87	(2.4)
35	2.25	2.89	1.31	6.43	1.09
36	1.84	1.76	1.99	2.24	(0.29)
37	3.12	3.68	0.62	0.86	(3.36)
38	0.29	(3.62)	1.25	5.96	(1.74)
39	2.46	4.44	2.17	3.9	(6.29)
40	2.46	(0.91)	0.4	2.29	(4.9)
41	(1.61)	(3.74)	2.03	2.98	(19.27)
42	(0.65)	(2.8)	(0.03)	(4.78)	(4.23)
43	0.32	(4.59)	1.83	9.84	(14.65)
44	3.91	4.49	1.62	3.84	9.15
45	1.15	4.98	1.32	(3.48)	3.31
46	0.45	2.24	0.32	5.03	(5.45)
47	1.82	1.57	2.45	(4.15)	(6.87)
48	4.22	1.91	1.05	3.37	1.02
49	(0.66)	1.29	(0.57)	4.39	(0.51)
50	2.67	1.85	(1.58)	2.06	7
51	2.67	(0.34)	(0.93)	(4.82)	5.47
52	1.87	1.54	2.7	6.09	(6.81)

CHART 3.1 showing the returns for the year 2004

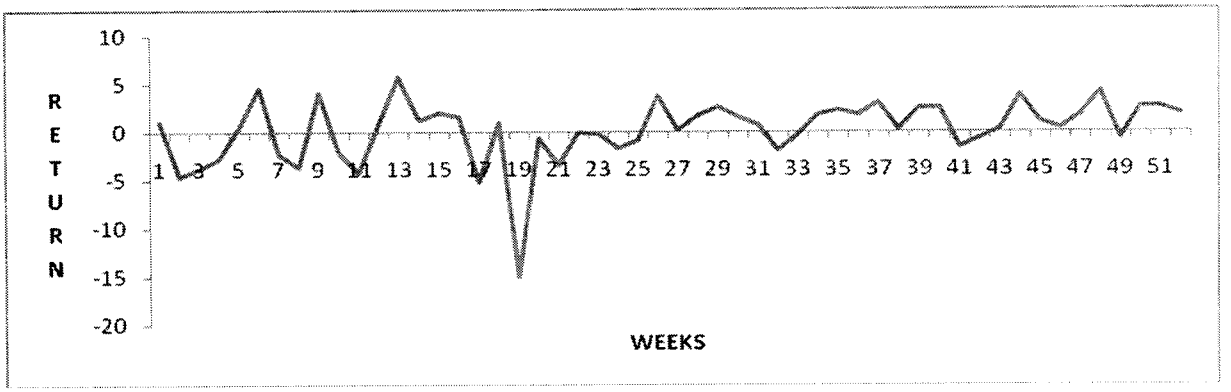


CHART 3.2 showing the returns for the year 2005

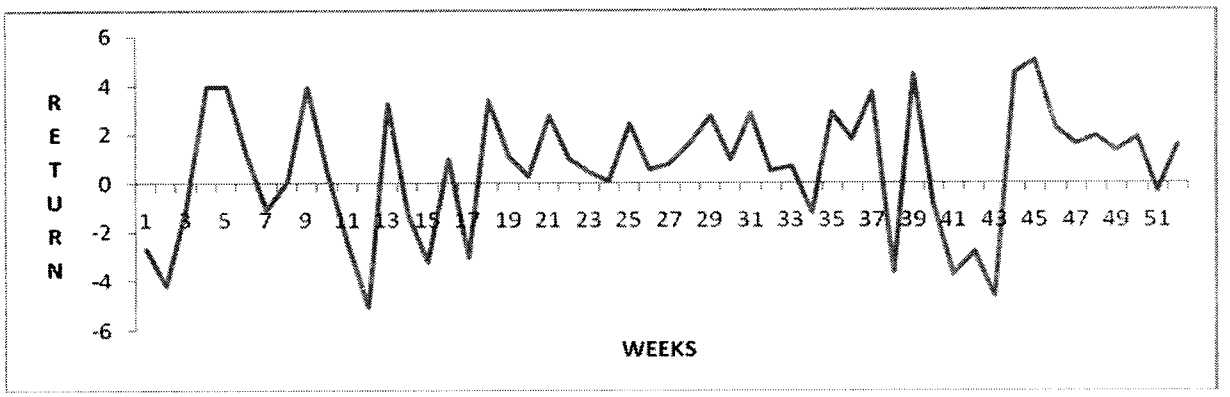


CHART 3.3 showing the returns for the year 2006

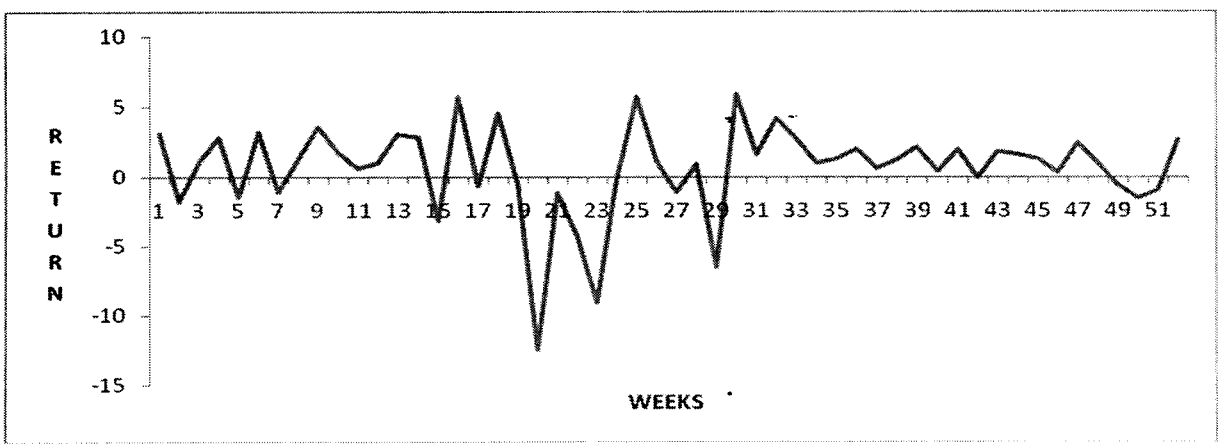


CHART 3.4 showing the returns for the year 2007

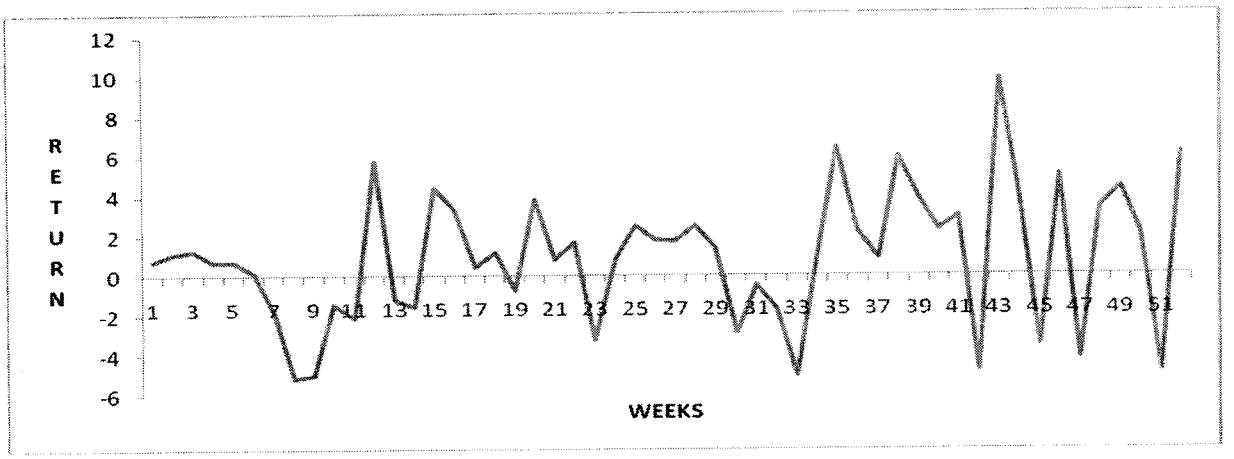


CHART 3.5 showing returns for the year 2008

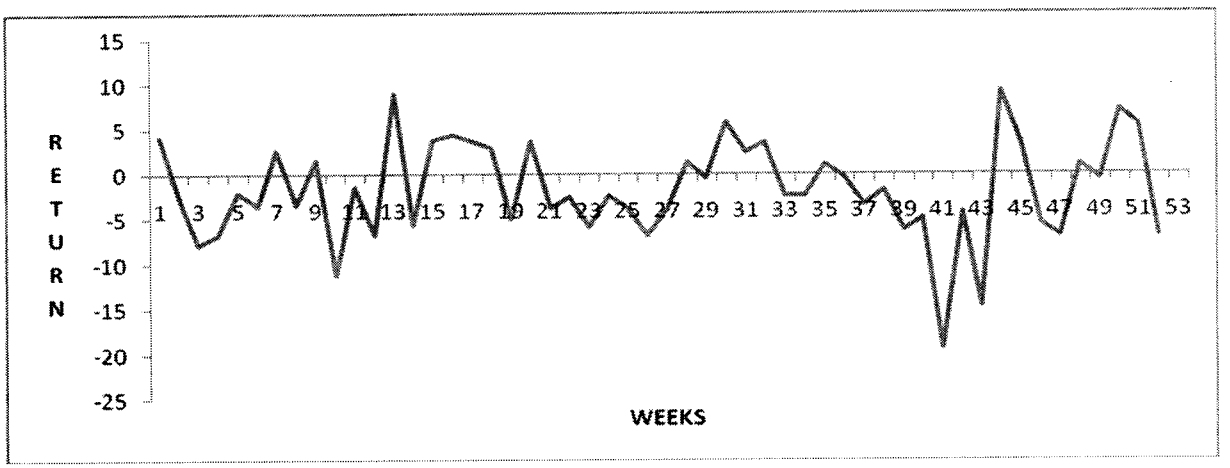


TABLE – 1.7 showing the Mean and Standard Deviation for the above given charts.

YEAR	2004	2005	2006	2007	2008
Mean	0.2161	0.5988	0.6308	0.9177	(1.7225)
Standard Deviation	3.3071	2.56213	3.31075	3.35570	5.54773

From the above charts we observe that,

- The mean average return was gradually increased for first four years and it is decreased in the last year.
- The risk factor is considerably low in 2005 when compared with the other four periods.
- The risk factor is more or less same for the years 2004, 2006, 2007.
- The risk factor is very high in the year 2008 when compared with the other four years.

TABLE – 1.8 showing the no. of positive and negative returns from year 2004 - 08.

YEAR	POSITIVE RETURN	NEGATIVE RETURN
2004	32	20
2005	36	16
2006	35	17
2007	35	17
2008	18	34

For the first four years the return was positive and the market shows good signs, but in last year the market shows high negative returns.

The reasons are as follows,

- Economic growth in India was high at the rate of 9%.
- U.S. crisis started in second quarter of 2007 in the form of subprime lending crisis. This made the Foreign Institutional Investors to sell their shares in the Indian market.
- The fallout effect of United States crisis on Indian Economy also reflected in the growth process. Our GDP was at about 6%.

RUN TEST

- Used to test the randomness in stock price movements.
- Only the direction of price change is considered.
- Increase in the price is represented by '+' sign and the decrease in the price is represented by '-' and no change is represented by '0'.
- Actual number of runs observed in a series of stock price movements is compared with a number of runs in a randomly generated number series.
- If no significant differences are found, then the security price changes are considered to be random in nature.

Year 2004:

No. of positive runs = 61

No. of negative runs = 60

Elements in positive runs = 151(n_1)

Elements in negative runs = 102 (n_2)

Year 2005:

No. of positive runs = 49

No. of negative runs = 50

Elements in positive runs = 143(n_1)

Elements in negative runs = 105(n_2)

Year 2006:

No. of positive runs = 55

No. of negative runs = 54

Elements in positive runs = 161(n_1)

Elements in negative runs = 92(n_2)

Year 2007:

No. of positive runs = 55

No. of negative runs = 55

Elements in positive runs = 151(n_1)

Elements in negative runs = 98(n_2)

Year 2008:

No. of positive runs = 53

No. of negative runs = 54

Elements in positive runs = 104(n_1)

Elements in negative runs = 137(n_2)

Total no. of positive runs = 273

Total no. of negative runs = 273

Total no. of runs = 546(r)

n_1 = (151+143+161+151+104) = 710

n_2 = (102+105+92+98+137) = 534

H_0: There is no significant influence of the past share prices over the present share prices.

H_1: There is a significant influence of the past share prices over the present share prices.

Formula:

$$\mu_r = (2n_1n_2 / n_1+n_2) +1 \text{(FORMULA – 2.2 for calculating mean)}$$

Solution: μ_r = 610.55

(FORMULA – 2.3 for calculating standard deviation)

$$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2 -1)]}$$

Solution: σ_r = 17.273

Standardized value 'r' is,

$$z = (r- \mu_r) / \sigma_r \text{ (FORMULA – 2.4 for arriving the final solution)}$$

Solution: z = (3.737)

@ 5% level of significance,

Table value = ±1.96

Calculated value = (3.737)

Calculated value > Table value

Therefore, **H_0 is rejected.** Hence it is proved that there is a significant influence of the past share prices over the present share prices. There is no relation between successive returns. Only staggered period have high relevance over weak form efficiency.

Table 1.9 showing total number of positive and negative runs.

RUNS	2004	2005	2006	2007	2008
POSITIVE	61	49	55	55	53
NEGATIVE	60	50	54	55	54
TOTAL	121	99	109	110	107

- In the year 2004 index starts with 2409.70 points and ends with 2779.65, the index raised by 370 points, therefore we are having high amount of positive and negative runs.
- In the year 2006 and 2007 the index gained 1400 and 3200 points respectively, therefore we have high amount of positive runs than 2005 and 2008.
- In the year 2008 the index fell by 5064 points therefore we have high amount of negative runs than positive runs.
- From this, we observe that the index is gaining points from 2004 to 2007 and in the year 2008 the index is going down by more than 5000 points. Because of this the number of positive and negative runs are decreased when compared with the years 2004, 2006 and 2007.

Run test for year by year:

2004

Positive runs = 61

Negative runs = 60

Total (r) = 121

$n_1 = 151$

$n_2 = 102$

$\mu_r = (2n_1n_2 / n_1+n_2) +1 = 122.755$

$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2-1)]} = 7.638$

$z = (r- \mu_r) / \sigma_r = (0.2298)$

@ 5% level of significance,

Table value = ±1.96

Calculated value = (0.2298)

Therefore, **H_0 is accepted.**

2005

Positive runs =49

Negative runs = 50

Total (r) = 99

$n_1 = 143$

$n_2 = 105$

$\mu_r = (2n_1n_2 / n_1+n_2) +1 = 121.089$

$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2-1)]} = 7.673$

$z = (r- \mu_r) / \sigma_r = (2.879)$

@ 5% level of significance,

Table value = ±1.96

Calculated value = (2.879)

Therefore, **H_0 is rejected.**

2006

Positive runs = 55

Negative runs = 54

Total (r) = 109

$n_1 = 161$

$n_2 = 92$

$\mu_r = (2n_1n_2 / n_1+n_2) +1 = 118.091$

$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2-1)]} = 7.344$

$z = (r- \mu_r) / \sigma_r = (1.238)$

@ 5% level of significance,

Table value = ±1.96

Calculated value = (1.238)

Therefore, **H_0 is accepted.**

2007

Positive runs = 55

Negative runs = 55

Total (r) = 110

$n_1 = 151$

$n_2 = 98$

$\mu_r = (2n_1n_2 / n_1+n_2) +1 = 119.859$

$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2-1)]} = 7.516$

$z = (r- \mu_r) / \sigma_r = (1.312)$

@ 5% level of significance,

Table value = ±1.96

Calculated value = (1.312)

Therefore, **H_0 is accepted.**

2008

Positive runs = 53

Negative runs = 54

Total (r) = 107

$n_1 = 104$

$n_2 = 137$

$\mu_r = (2n_1n_2 / n_1+n_2) +1 = 119.241$

$\sigma_r = \sqrt{[2n_1n_2 (2n_1n_2 - n_1-n_2) / (n_1+n_2)^2(n_1+n_2-1)]} = 5.397$

$z = (r- \mu_r) / \sigma_r = (2.268)$

@ 5% level of significance,

Table value = ±1.96

Calculated value = (2.268)

Therefore, **H_0 is rejected.**

TABLE – 1.10 showing the results of Runs test for 5 years.

YEAR	NULL HYPOTHESIS
2004	Accepted
2005	Rejected
2006	Accepted
2007	Accepted
2008	Rejected

Weak form market efficiency is time dependant. It is not consistent over long period but it is consistent only in short period.

T – Test:

A t-test is any statistical hypothesis test in which the test statistic has a Student's t distribution if the null hypothesis is true. It is applied when the population is assumed to be normally distributed but the sample sizes are small enough that the statistic on which inference is based is not normally distributed because it relies on an uncertain estimate of standard deviation rather than on a precisely known value.

This test is used only when the two sample sizes are unequal and the variance is assumed to be different. See also Welch's t test. The t statistic to test whether the means are different can be calculated as follows:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{s_{\overline{X}_1 - \overline{X}_2}}$$

Where,

$$s_{\overline{X}_1-\overline{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Table - 1.11 showing number of elements in a positive run.

Elements in a run	No. of elements
2	70
3	34
4	27
5	15
6	11
7	5
8	3
9	3
10	2
11	1

Table – 1.12 showing number of elements in a negative run.

Elements in a run	No. of elements
2	68
3	32
4	15
5	13
6	3
7	1
8	1

TABLE – 1.13 Frequency Table

X	2	3	4	5	6	7	8	9	10	11
Y	70	34	27	15	11	5	3	3	2	1
Z	68	32	15	13	3	1	1	-	-	-

TABLE – 1.14 showing the Standard Deviation calculation between X & Y

X	Y(f)	fx(1*2)	μ	(X - μ)	$(X - \mu)^2$	$f(X - \mu)^2$
2	70	140	3.5	(1.5)	2.25	157.5
3	34	102	3.5	(0.5)	0.25	8.5
4	27	108	3.5	0.5	0.25	6.75
5	15	75	3.5	1.5	2.25	33.75
6	11	66	3.5	2.5	6.25	68.75
7	5	35	3.5	3.5	12.25	61.25
8	3	24	3.5	4.5	20.25	60.75
9	3	27	3.5	5.5	30.25	90.75
10	2	20	3.5	6.5	42.25	84.50
11	1	11	3.5	7.5	56.25	56.25
	N = 171	Σfx = 608				$\Sigma f(X - \mu)^2$ = 532

Mean = $(\Sigma fx / n)$ = (608 / 171) = 3.5 (FORMULA – 2.5 for calculating mean in t - test)

$\sigma^2 = (\Sigma f(X - \mu)^2 / N)$ = (532 / 171) (FORMULA – 2.6 for calculating variance)

Solution = 3.11 (Standard Deviation)

TABLE – 1.15 showing the Standard Deviation calculation between X & Z

X	Z(f)	fx(´*2)	μ	(X - μ)	$(X - \mu)^2$	$f(X - \mu)^2$
2	68	136	2.95	(0.95)	0.9025	61.37
3	32	96	2.95	0.05	0.0025	0.08
4	15	60	2.95	1.05	1.1025	16.5375
5	13	65	2.95	2.05	4.2025	54.6325
6	3	18	2.95	3.05	9.3025	27.9075
7	1	7	2.95	4.05	16.4025	16.4025
8	1	8	2.95	5.05	25.5025	25.5025
	N = 133	Σfx = 393				$\Sigma f(X - \mu)^2$ = 202.4325

Mean = (Σfx / n) = (393 / 133) = 2.95

$\sigma^2 = (\Sigma f(X - \mu)^2 / N) = (202.4325 / 133)$

Solution = 1.522 (Standard Deviation)

$$t = \frac{\overline{X}_1 - \overline{X}_2}{s_{\overline{X}_1 - \overline{X}_2}}$$ (FORMU'.A - 2.7)

Where,

$$s_{\overline{X}_1 - \overline{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

H_0: There is no difference.

H_1: There is difference.

t = [(3.5 – 2.95) / √ (3.11 / 171) + (1.522 / 133)]

t = 3.195

@ 5% level of significance,

Table value = 2.201

Calculated value = 3.195

Calculated value > Table value

Therefore, **H_0 is rejected.** Thus there is a difference between the positive and negative runs. Positive runs are dominated by Real Investors and negative runs are dominated by Speculators.

Real Investors would watch the market and the company carefully and based on that they made their investments. Because of this only the positive runs are higher than the negative runs.

But, the speculators will sell the shares once the price will start to creeps down. This was done by them to escape from the risk factor. Because of this the negative runs are ended shortly.

FINDINGS

- For the first four years the return wa ; positive and the market shows good signs, but in last year the market shows high negative returns.
- In Run test, **H_0 is rejected.** Hence it is proved that there is a significant influence of the past share prices over the present share prices. There is no relation between successive returns. Only staggered period have high relevance over weak form efficiency.
- Weak form market efficiency is time dependant. It is not consistent over long period but it is consistent only in short period.
- In T – Test, **H_0 is rejected.** Thus there is a difference between the positive and negative runs. Positive runs are dominated by Real Investors and negative runs are dominated by Speculators.
- Real Investors would watch the market and the company carefully and based on that they made their investments. Because of this only the positive runs are higher than the negative runs.
- But, the speculators will sell the shares once the price will start to creeps down. This was done by them to escape from the risk factor. Because of this the negative runs are ended shortly.

RECOMMENDATIONS:

From the above findings it is clear that the returns from the market are negative for the year 2008. Technical analysis is mainly done for the short runs in the market and it is always done for the speculators in the market. In a boom market, market makers make good profits whereas in depressed market the profits slowdown.

CONCLUSION

This study mainly seeks evidence of market efficiency and keen to see whether Indian Capital Market return series is independent or follows random walk model. Runs test is employed to assess the predictability of daily return series of BSE - 500 and to test the null hypothesis of random walk model. The empirical results reject the null hypothesis of random walk model for the daily return series of BSE – 500 for the period of 2004 – 2008. Thus it is clear that there is a significant influence of the past share prices over the present share prices. By doing T – Test we are able to found the difference between the real investors and speculators in the market. There fore in boom market the market makers gain higher profits and in the recession market the market makers profits will slows down.

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