National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org

A STUDY ON STATIONARITY OF RETURN SERIES IN INDIAN STOCK MARKET

DR. SANJEET SHARMA

Assistant Professor, University College of Business Studies, Ava-Lodge, Chaura Maidan, Shimla, H.P.

Abstract

The present study attempted to test the stationary of return series in the Indian stock market. In the present study, long time series of BSE Sensex is used from January 2011 to December 2017. Data for the study consist of secondary data. Data has been collected from the BSE website. The stationary condition has been tested using Augmented Dickey-Fuller (ADF). KPSS test is also used for confirmatory data analysis. Autocorrelation Function (ACF) and Ljung and Box (Q) Statistic are also used for testing the stationary of data. It is found from the results that the autocorrelation coefficients are hovering around zero and hypotheses of unit root in the stock return series rejected. Thus, the series is stationary. It suggests that the Indian stock market does not show characteristics of random walk and inefficient in the weak form.

Keywords: Indian Stock Market, BSE, Sensex, stationary of return series

INTRODUCTION

Financial models are based assumption that the data are stationary and the stationarity of financial data is a matter of fanatical research in the past decade. A stationary data series is mean reverting. The covariance between two time periods depends on the lag between the periods and not when the covariance is computed. i.e. the covariance is structurally constant. Stationarity means that there is no trend in the time series. It plays an important role in the modeling of stock market volatility, testing of stock market efficiency, cointegration, and causality analysis. In the present study, an attempt has been made to study the stationarity of stock return series in India. This paper attempts to test the stock returns in the Indian stock market, using the daily data of stock indices of BSE for the period 2011-2017. The remainder of the paper is organized as Section II reviews the literature, in section III, the objective and scope of the study are presented. Section IV includes the methodology used for the study. In section III, the key results from the empirical investigation are reported, and in section, IV conclusions are drawn.

National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org

REVIEW OF LITERATURE

A review of the literature is presented in the following table:

Contributor	Contribution
Granger (1974)	Non-stationarity leads to the estimation of spurious regression.
Sharma and Kennedy (1977)	Studied: Behaviour of market indices of Bombay, London, and New York stock exchanges, Tools: runs test and inspectorial analysis techniques Data: monthly data from 1963-73, Conclusions: BSE stocks obey the random-walk model.
Barua (1981)	Studied: efficiency of Indian stock market is weak-form Data: daily closing prices of 20 shares and over the two years 1977-1979 Confirmed: the efficiency of the Indian stock market is weak form.
Gupta (1985)	Tested: the EMH in the Indian stock market Data: for the period 1971 to 1976 based on share prices of 39 companies. Conclusions: The random walk model was confirmed.
Gupta (1997)	Studied: a weak form of efficiency of Indian stock market Data: of a specified and non-specified group of BSE-100 index from January 1990 to February 1992. Tools: serial correlation analysis Results: the result of the analysis validated the weak form of EMH
Mitra (2000)	Testing: random walk hypothesis Tools: neural network model Results: disproved the random walk hypothesis
Deb (2003)	Tested: the weak form of efficiency Data: five major market indices of the Indian stock market Findings of the study: showed that though the general Indian stock market does not follow the random walk model
Nath and Dalvi (2005)	Examined: the day of the week effect anomaly Data: the year 1999 to 2003 for Nifty Results: found that market inefficiency exists
Satish K. Mittal and Sonal Jain (2009)	Examined: three types of stock market anomalies Data: daily data for indices of the National Stock Exchange, Nifty, and the Bombay Stock Exchange, Sensex, for the period of 1999-2004 Rejected: random walk hypothesis for both the indices
A. Q. Khan et al., (2011)	Tested: the weak form of market efficiency Data: using the daily closing values of the indices of NSE and BSE Tools: Runs Test, a non-parametric test
Sachin et al., (2014)	Investigated: the Indian stock market's efficiency Tools: serial autocorrelation test Results show that the Indian stock market is weak-form inefficient.
Hartika Arora et al., (2017)	Attempts: to verify the weak form of efficient market hypothesis Data: Nifty 50 from 1st January 2009 to 31st March 2011 Results: Present evidence for the nonexistence of the weak form of efficiency

National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org

OBJECTIVE AND SCOPE OF STUDY

The objective of the present study is to test the stationarity of stock return series in the Indian capital market. In the paper, an attempt has been made to test the null hypothesis that the stock return series of India are non-stationary. In the present study, long time series of BSE Sensex is used from January 2011 to December 2017. Data for the study consist of secondary data. Data has been collected from the BSE website.

METHODOLOGY

The following methods are used to test the Random Walk Hypothesis in Indian stock markets.

Unit Root Tests: The unit root test checks whether a series is stationary or not. The stationary condition has been tested using Augmented Dickey-Fuller (ADF). Further, the KPSS test is also used for confirmatory data analysis.

Autocorrelation Function (ACF): The ACF, 1k, is used to determine the independence of the stock price changes. The sample autocorrelation function (ACF) and partial autocorrelation function (PACF) are useful qualitative tools to assess the presence of autocorrelation at individual lags.

Ljung and Box (Q) Statistic: The Q-statistic is used to test whether a group of autocorrelations is significantly different from zero.

EMPIRICAL ANALYSIS

The empirical results are presented below.

Descriptive Statistics and Test for Normality

Table 1 provides summary statistics about return Series, namely sample means, minimum, maximum, median, standard deviation, coefficient of variation, skewness, kurtosis, and the jarque-bera. The values of skewness and kurtosis showed in the table suggest that the return series are not normally distributed. Further, Jarque-Bera test also rejects the null hypothesis of normal distribution for the stock return series.

Table 1: Descriptive Statistics

Statistics	Value
Mean	-0.005724
Median	0.000460
Maximum	0.037034
Minimum	-10.43579

National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org

Std. Dev.	0.250736
Skewness	-41.52252
Kurtosis	1727.745
Jarque-Bera	2.16E+08
Probability	0.000000

Autocorrelations test

The results of the autocorrelation test have been provided in Table-2. It is clear from the table that the autocorrelation coefficients are hovering around zero. Thus, the stock return series in the Indian stock market is stationary. Further, the null hypothesis of the Q-statistic is accepted and it can be said that the data are independently distributed at various lag lengths and do not exhibit serial correlation. Therefore, the correlogram test for stationarity suggests evidence that the stock return series in the Indian capital market is stationary.

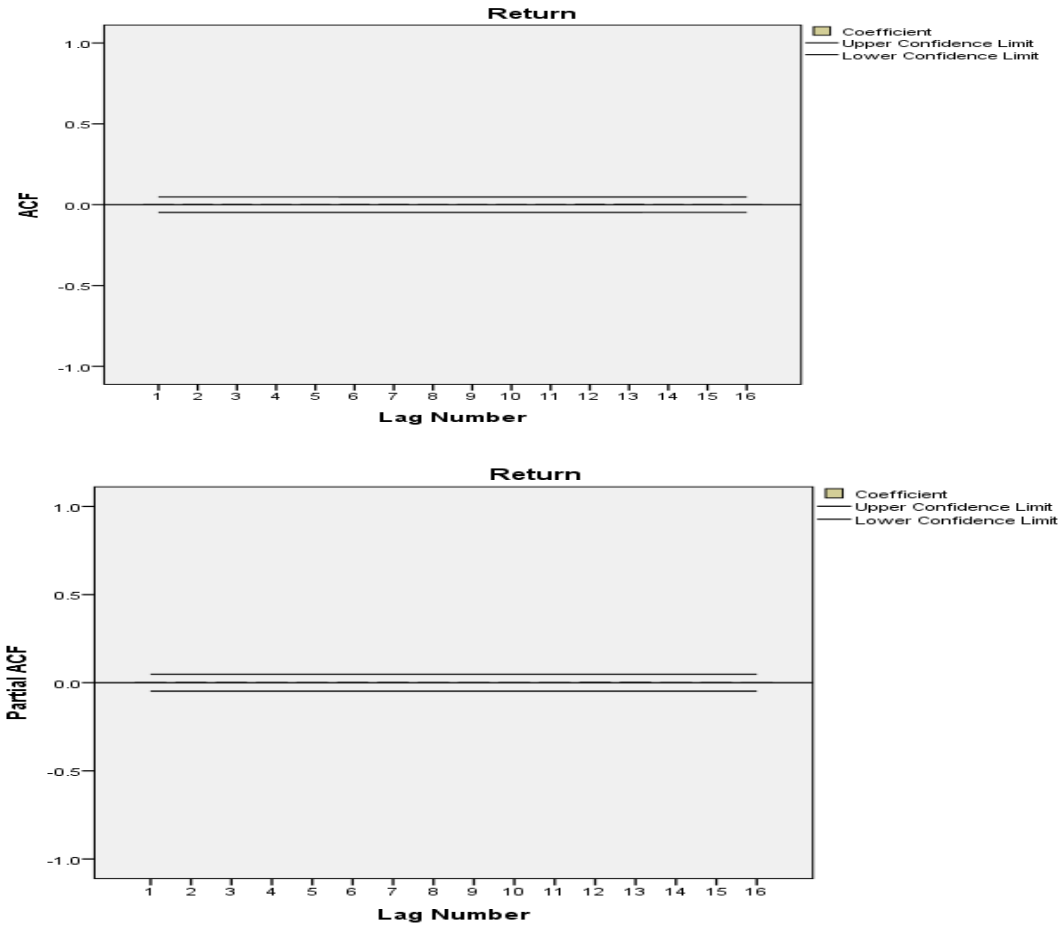
Table 2: Autocorrelations

Lag	Autocorrelation	Std. Error[a]	Partial Autocorrelation	Std. Error	Box-Ljung Statistic	
					Value	Sig.[b]
	.000	.024	.000	.024	.000	.985
	.000	.024	.000	.024	.000	1.000
	.000	.024	.000	.024	.001	1.000
	.000	.024	.000	.024	.001	1.000
	-.001	.024	-.001	.024	.001	1.000
	.000	.024	.000	.024	.001	1.000
	.000	.024	.000	.024	.001	1.000
	-.001	.024	-.001	.024	.002	1.000
	.000	.024	.000	.024	.002	1.000
	-.001	.024	-.001	.024	.003	1.000
	-.001	.024	-.001	.024	.003	1.000
	.001	.024	.001	.024	.004	1.000
	.001	.024	.001	.024	.005	1.000
	-.001	.024	-.001	.024	.005	1.000
	-.001	.024	-.001	.024	.006	1.000
	-.001	.024	-.001	.024	.008	1.000

a. The underlying process assumed is independence (white noise).

b. Based on the asymptotic chi-square approximation.

National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org



ADF unit root test

The results of the ADF unit root test are summarized in Table-3. This study conducts a test of stationarity for the Indian stock markets in India, using stock market return. It employs unit root tests (augmented Dickey-Fuller (ADF) and KPSS). The null hypothesis in the case of ADF is that the series is non-stationary, whereas in the case of the KPSS test it is series is stationary. ADF test is performed with no intercept and no trend. Further, the KPSS test is also used for confirmatory data analysis. The table shows that the null hypotheses of existence of unit roots are rejected. Thus, the series is stationary. It suggests that the Indian stock market does not show characteristics of random walk and as such is not efficient in the weak form. KPSS test is also used for data analysis and finding the series to be stationary. The same evidence has been inferred from the KPSS test as the test statistics are less than critical values. The results have been found statistically significant and the results of all the two tests are consistently

National Journal of Commerce and Management: Peer-Reviewed/Refereed Journal
ISSN 2394-6342 | Volume 05, Issue 01, December 2018
http://njcm.pratibha-spandan.org

suggesting these markets are not weak-form efficient. In other words, the stock return series in the Indian capital market is stationary. Results of the study suggest that the markets are not weak-form efficient.

Table 3: Unit Root Tests

Test	Test Statistic	Test Critical Values	Hypothesis
ADF test	-2.11904	-1.94006 (5% Level)	Rejected
KPSS Test	0.32267	0.73900 (1% Level) 0.46300(5% Level)	Accepted

CONCLUSION

The objective of the present study is to test the stationary of stock return series in the Indian capital market. In the present study, long time series of BSE Sensex is used from January 2011 to December 2017. Data for the study consist of secondary data. Data has been collected from the BSE website. The stationary condition has been tested using Augmented Dickey-Fuller (ADF). KPSS test is also used for confirmatory data analysis. Autocorrelation Function (ACF) and Ljung and Box (Q) Statistic are also used for testing the stationary of data. It is found from the results that the autocorrelation coefficients are hovering around zero and null hypotheses of unit roots are rejected. Thus, the series is stationary. It suggests that the Indian stock market does not show characteristics of random walk and as such is not efficient in the weak form.

REFERENCES

Ahmad, K. M., Shahid Ashraf and Sahid Ahmed (2006), "Testing weak-form efficiency for Indian stock markets," Economic and Political Weekly, Vol. XLI, No. 1, pp.49-57.

AQ Khan, Sana Ikram, and Mariyam Mehtab (2011) Testing weak-form market efficiency of indian capital market: A case of national stock exchange (nse) and bombay stock exchange (bse). African Journal of Marketing Management, 3(6):115–127.

Atiasa, R.K. (1985), "Pre-disclosure information, Firm Capitalization and security price behavior around Earnings Announcement", Journal of Accounting Research, Vol. 23, No. 2, pp. 215-235.

Ball and Brown, P. (1968) "An Empirical valuation of Accounting income Numbers", Journal of Accounting Research, Vol. 6, No. 2, pp. 157-178.

Barua, S. K. (1981)," The Short-Run Price Behaviour of Securities- Some Evidence on Efficiency of Indian Capital Market," Vikalpa, Vol.6, No.2. pp. 93-100.

Barua, S. K. and Raghunathan,V.,(1986)," Inefficiency of Indian Capital Market," Vikalpa, Vol.11, No.3.(July-september).

Barua, Samir K, V. Raghunathan and J. K. Varma (1994): 'Research on the Indian Capital Market: A Review', Vikalpa, 19.

Bhaumik, S. K. (1997): 'Stock Index Futures in India: Does the Market Justify Its Use'?' Economic and Political Weekly, 32, pp. 2608-11.

Bodla, B.S. (2005), "Efficiency of the Indian Capital Market: An Empirical Work," Vision, Vol. 9, no. 2, pp. 55-63.

Butler, K .C. and S. J. Malaikah (1992): 'Efficiency and Inefficiency In thinly Traded Stock Markets: Kuwait and Saudi Arabia'. Journal of Banking and Finance, 16, pp 197-210.

Chandra, Prasanna (1981), "Valuation of Equity Shares in India", Sultan Chand and sons, New Delhi, 1981.

Chaudhuri, S. K. (1991)," Seasonality in Share Returns: Preliminary Evidence on the Day-of-the-week-effect," Chartered Accountant," Vol.40, No.5, pp. 407.

Chaudhuri, S. K. (1991)," Short-Run Share Price Behaviour of Securities: New Evidence on Weak Form of Market Efficiency," Vikalpa, Vol.16, No.4.(October-December).

Chawla , Deepak and Munish Makkad (2000), " Weak Form Efficiency in Indian Capital Market: An Empirical Investigation," Management and Accounting Research, Vol. 4, No. 2, pp. 67-90.

Chou,Y L,(1969): Statistical Analysts, Holt Rinehart and Winston, London.

Choudhary, S. .K. (1991): 'Short-run Behaviour of Industrial Share Prices: An Empirical Study of Returns, Volatility and Covariance Structure, Prajnan, 20, pp 99-113.

Da Costa, N. (1994): 'Overreaction in the Brazilian Stock Market', Journal of Banking and Finance, 18, pp 633-42.

Deb, S. S. (2003), " In Search of Weak Form of Efficiency in India Capital Market," The ICFAI Journal of Applied Finance" Vol. 9 , No. 9, pp. 31-50.

Desai, Meghnad (1965), "Stock Prices, Earnings and dividends in India– A quantitative Analysis", Indian Economic Journal, Vol. 12, pp. 432-436.

Dhankar, Raj S and Madhumita Chakraborty (2005): 'Testing of Stock Price Behaviour in Indian Markets: An Application of Variance Ratio Test and ARIMA Modelling', ICFAI Journal of Applied Finance, 11.

Dixit, R. K. (1986) "Behavior of Equity shares prices and investment in India", Deep and Deep Publications, New Delhi, 1986.

Dutta, S. K. (2004), "The Share price and its valuation", The Management Accountant, April 2004, Vol. 39, No. 4, pp. 274-282.

Dylea, et al., (2002), "Do share prices matters?" Journal of Accounting and Finance, Vol. 42, pp. 225-237.

Frennberg, P. and B. Hansson (1993), "Testing the Random Walk Hypothesis on Swedish Stock Prices," 1919-1990', Journal of Banking and Finance, 17, pp 175-91.

Greawal, S. S. (1986), "Making Money on the Stock Market," Vision Books, New Delhi, 1986.

Grossman, S. and J. Stiglitz (1980)," On the Impossibility of Informationally Efficient Markets", American Economic Review, 70, pp 393-408.

Gupta, O. P. (1997)," An empirical Test of Random Walk Model on the Indian Stock Market " Management & Change, Vol.1,No.1.

Haritika Arora, et al. (2017) Testing weak-form efficiency of Indian stock market using high frequency.

K Sachin and Kantesha Sanningammanavara. The efficiency testing of weak form of the indian stock market. International Journal of Engineering and Management Research (IJEMR), 4(4):44–53, 2014.

Khan, M.Y. and P.K. Jain (1994), "Financial Management tent and problems", Tata mcgrow – Hill Publishing Company Limited, New Delhi.

Khanna, S. (1999), "Financial Reforms and Industrial Sector in India", Economic and Political Weekly, November 6, pp. 3231-3241.

Linter, John (1965)," Security prices, risk, and maximal gain from diversification", Journal of Finance, 20, pp 587-615.

Mitra, S. K. (2000) ,"Forecasting Stock Index Using Neutral Networks," The ICFAI Journal of Applied Finance, Vol. 6 , pp. 36-52.

Mittal ,Satish K. and Sonal Jain (2009), "Stock Market Behaviour: Evidences from Indian Market," Vision, Vol. 13, No. 3, pp.19-29.

Nath, Golka C. and Manoj Dalvi (2005), "Day-of-the-week effect and Market Efficiency: Evidences from Indian Equity Market Using High Frequency Data of National Stock Exchange", The ICFAI Journal of Applied Finance, Vol. 11.

Pandey, Ajay (2002), "The Extreme Value Volatility Estimators and their Empirical Performance in Indian Capital Markets", NSE Research Paper no.14.

Ramasastri, A. S. (1999), "Market Efficiency in the Nineties : Testing Unit Roots," Prajnan, Vol. 28, pp. 155-161.

Ranganatham, M. and V. Subramanian (1993), "Weak Form Efficient Markets Hypothesis: A Spectral Analytic Investigation, Vikalpa, Vol. 18, No. 2. pp. 25-31.

Sachdeva, Y.P. (1994), "Rise and fall of share prices Factors and determinants", Deep and Deep Publications, New Delhi.

Samanta, G. P. and Kaushik Bhattacharya (2002), "Is the Spread between E/P Ratio and Interest Rate Informative for Future Movement of Indian Stock Market?" NSE Research Paper no.7.

Sharma, J.L and Kennedy, Rebert 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.

Singh, A. (1995) "Equity Price behavior in Indian Corporate Sector", Phd, Thesis, Guru Nanak Dev University, Amritsar.