

## AN ANALYTICAL STUDY OF INTEREST RATE AND STOCK RETURNS IN INDIA

by  
**Dr. T. Muthukumar**<sup>[a]</sup> & **Dr.V.K.Somasundaram**<sup>[b]</sup>

### Abstract

*The present study tries to estimate causality relationship between interest rate and stock returns. The impact of interest rate and stock returns in India is studied, by using monthly data from April 1997 to March 2014. We have considered macro variables for the study: 91-Treasury Bill (91-TB), and BSE SENSEX. The study reveals there exists short term relationship among the interest rate and stock returns through Granger causality technique. In the short run results show that there is no causality between interest rate and stock returns. The study implies that the interest rate neither affects stock returns nor stock returns affect the interest rate. Thus, the present study empirically proves, stock market has no relation with the growth of interest rate in India and vice versa.*

**Key Words:** Inflation, Wholesale Price Index, Stock market, Net earnings, interest rate, Causality relationship

<p><sup>[a]</sup> <b>Dr. T. Muthukumar</b> Head, Dept. of Management Studies, Saradha Gangadharan College, Puducherry -4, INDIA muthukumar1871981@gmail.com <b>9865757157</b></p>	<p><sup>[b]</sup> <b>Dr.V.K.Somasundaram</b> Head, PG &amp; Research Dept. of Corporate Secretaryship, Bharathidasan Govt. College for Women, Puducherry-3 INDIA <a href="mailto:drvkspondy@rediffmail.com">drvkspondy@rediffmail.com</a> <b>9442123483</b></p>
---	---

### 1. Introduction

The financial liberalization paved a new way for growth, development and volatile atmosphere to the Indian economy especially in terms of stock market. The Indian stock market has emerged as the most active stock market of the world during the last decade or so. It has also attracted the investors across the globe by expanding the horizons. It resulted in increase in terms of number of listed companies, shareholders, volume of trade and market capitalization. The smoothing development process in Indian stock market continues to be remarkable. From 3,740 points on March 31<sup>st</sup> 1999, with in nine years; Bombay Stock Exchange (BSE) Sensitivity Index (SENSEX) had reached to 21,000 points in January, 2008. In India, only about two per cent of the total population does involve in stock markets operations. But the entire economy gets affected directly or indirectly, if something happens in the stock markets. It shows clearly that there is a strong correlation between stock markets and real economy. For example, BSE total market capitalization as a percentage of India's Gross Domestic Product (GDP), has increased from 4 per cent in 1978-79 to around 78 per cent in 2011-12. Thus, it is understood that the domestic economic fundamentals play a vital role in determining the performance of stock market. Thus, it is observed that the stock market, being an important part of the financial system should have a systemic linkage with fundamentals of the economy.

The economic reason behind the logic is the price of stock necessarily reflects all the future cash flows discounted by the appropriate discount rate. The future cash flows depend on many economic factors like GDP growth, Wholesale price index (WPI), Interest rate, exchange rate fluctuations, global and domestic oil prices, etc (Naka, Mukherjee and Tufle (2001). The causal relationships between the BSE Sensex and five specified macroeconomic variables was tested by

Bhattacharya and Mukherjee (2002) applying the techniques of unit-root tests, cointegration and long-run Granger non-causality test proposed by Toda and Yamamoto and found that there are no causal linkage between the stock prices and money supply, national income and interest rate while the index of industrial production leads the stock price and there exists a two-way causation between stock price and rate of inflation. There is a long-term equilibrium relationship among the macroeconomic variables and stock market indicators as shown by the studies of Golaka C Nath and Dr. Y.V. Reddy (2004) and Soumya Guha Deb and Jaydeep Mukherjee (2008) examined that there is strong causal flow from the stock market development to economic growth. A bi-directional causal relationship is also observed between real market capitalization ratio and economic growth. It is also observed that there is high correlation between exchange rate and gold prices and it highly affects the stock prices. The effect of foreign exchange reserves and inflation in the stock price is only limited as found by Gagan Deep Sharma (2010). The present study is an attempt to examine the interaction between interest rate and stock returns in India.

## **2. Statement of the Problem**

According to modern financial theory, systematic factors affect the long run return on financial asset. It implies that security market must have a significant relationship with real and financial sectors of the economy. This relationship is generally viewed in two ways. (i) The macro economic variables influence the stock market operations especially equity returns.(ii) Similarly, the stock market is influenced by the macroeconomic variables. Although, there is much research about short run and long run relationship between macroeconomic variables and stock markets especially in developed countries, but there is a gap in literature in this area of developing and fast developing economies. The present study is necessitated to fill up the gap. The present study is aimed to evaluate and analyze the Interest rate and Stock returns in India.

## **3. Objectives of the Study**

The specific objectives of the study are as follows;

- To identify the nature of relationship between interest rate and stock returns in India
- To examine the causal nexus between interest rate and stock returns in India

## **4. Methodology**

### **Data collection and Analysis:**

The data used for the present research work is principally secondary data. The data were collected from BSE and Reserve Bank of India (RBI). Other necessary information was collected from the Centre for Monitoring Indian Economy (CMIE) reports. The relevant literature was gleaned from books, journals and magazines. The impact of Interest rate and Stock returns in India is studied, by using monthly data from April 1997 to March 2014. This period is not only the economic reform period but also depicted a great deal of volatility.

### **Variables Justification**

#### **Dependent Variable**

#### **Stock Returns**

Stock returns has been calculated by using following equation

$$R_t = \ln(I_t / I_{t-1})$$

Where,

$R_t$  = Return for month 't'

$I_t$  and  $I_{t-1}$  = Average values of BSE-Sensex Index for month 't' and t-1 respectively.

BSE SENSEX is taken as a proxy for equity returns. The SENSEX is the benchmark index of the Indian Capital Markets with wide acceptance among individual investors, institutional investors, foreign investors and fund managers. The BSE SENSEX is not only scientifically designed but also based on globally accepted construction and review methodology. First compiled in 1986, SENSEX is a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. The base year of SENSEX is 1978-79 and the base value is 100.

### **Independent Variables**

#### **Interest rate**

Treasury bill rates have been used as proxy of interest rate. At present, the Government of India issues three types of treasury bills through auctions, namely; 91 days, 182 days and 364 days. The treasury bills are issued in the form of promissory note in physical form or by credit to Subsidiary General Ledger (SGL) account or Gilt account in dematerialized form.

#### **Analytical Procedure**

The present study tried to analysis the relationship between interest rate and stock returns, to focus on 'causality' among the variables using the method developed by Granger. Statistical and econometric tools have been used to test and verify the results of the study for their accuracy. The tools namely descriptive statistics, correlation analysis, and Granger causality test have been used for examining the short-run interdependence between variables. The study uses three different tests, i.e., Augmented Dickey Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski, Phillips, Schmidt. and Shin (KPSS) test for finding unit roots in time series.

#### **Hypothesis**

In order to answer whether the interest rate causes the stock returns, the following hypotheses are framed:

Ho: Interest rate does not cause stock returns

Ho: Stock returns does not cause interest rate

#### **Relationship between Interest rate and Stock Returns**

A rise in the interest rates affects the valuation of the stocks. The rise in the interest rates raises the expectations of the markets participants, which demand better returns that commensurate with the increased returns on bonds. In a low interest rate regime, corporates are able to increase profitability by reducing their interest expenses. However in a rising interest rate regime, as interest expenses rise, profitability is affected. When interest rates rise, investors move from equities to bonds. Whereas when interest rates fall, returns on bonds fall while the returns on equities tends to look relatively more attractive and the migration of fund from bonds to equities takes place, and increasing the prices of equities.

Interest rate and stock market are inversely related. As the interest rates go up, stock market activities tend to come down. Capital intensive industries would be heavily affected by high interest rates but when the interest rates decrease they would be gaining the most. It is better to avoid investments in sectors such as real estate, automobiles etc when the interest rates are rising. Companies with a high amount of loans in their balance sheets would be affected very seriously. Interest cost on existing debt would go up affecting their Earning Per Share (EPS) and ultimately the stock prices. But during low interest rate these companies would stand to gain. In a high interest rate scenario, companies with zero or near zero debts in their balance sheets would be the kings. Fast moving consumer goods (FMCG) is one sector that is considered as a defensive sector due to its low debt nature.

Sectors like Pharma and Information Technology (IT) are less affected by interest rates. The IT sector is more influenced by factors such as currency rate fluctuations, rising attrition level, visa restrictions, competition from the large global players and margin pressures. Certainly, IT sectors

are not interest rate-sensitive. Pharma is considered as the defensive sector and investors can invest here during uncertain and volatile market conditions. Banking sector is likely to benefit most due to high interest rates. The Net Interest Margins for banks is likely to increase leading to growth in profits and the stock prices.

Relationship of interest rate and stock returns has been widely examined by researchers. In literature, French, K. R., Schwert, G. W. and Stambaugh, R. E. (1987), French, K. R., Schwert, G.W. and Stambaugh, R. E. (1987) documented theoretically, that stock returns responded negatively to both the long term and short term interest rates. Choi and Jen (1991) report that the expected returns on common stocks are systematically related to the market risk and the interest-rate risk. The findings of the study indicate that the interest-rate risk for small firms is a significant source of investors' portfolio risk and the interest-rate risk for large firms is "negative". Allen and Jagtianti (1997) pointed out that the interest rate sensitivity to stock returns has decreased dramatically since the late 80's and the early 90's because of the invention of interest rate derivative contracts used for hedging purposes. The empirical results of Muradoglu and Metin (2001) indicate that growth rates of interest rates negatively affect stock returns with a significant lag in short run dynamic model. Few recent studies carried out in Indian context, Bhanumurthy and Agarwal (2003) observed that nominal interest rates adjust only to movements in the wholesale market prices but the relationship was not robust. They concluded that interest rate determination in India need not focus much on the domestic inflation rate, as there seems to be no strong co-movement between them. Bhatt and Virmani (2005) showed that short term interest rates in India are getting progressively integrated with those in the US even though the degree of integration is far from perfect.

## 5. Analysis and Interpretation

The short run causality between Interest rate and Equity returns is analyzed as below:

**Table - 1**  
**Descriptive Statistics**

Variables	Levels		First Difference	
	Stock Returns	Interest Rate	Stock Returns	Interest Rate
Mean	8.932	1.881	0.009	-0.002
Maximum	9.916	2.542	0.193	0.294
Minimum	7.961	1.168	-0.279	-0.374
Std. Dev.	0.692	0.292	0.066	0.074
Skewness	0.076	-0.438	-0.615	-1.071
Kurtosis	1.356	2.702	4.465	9.243
Jarque-Bera	21.799	6.857	29.138	347
Probability	0.000	0.032	0.000	0.000
Sum	1715	361	1.632	-0.343
Observations	192	192	191	191

Table provides the summary statistics on the levels of the variables and first difference. Summary statistics include the mean and the standard deviation, minimum maximum, skewness and Kurtosis value for the period 1997-98 to 2012-13. The mean, median, maximum, minimum and standard deviation can determine the statistical behavior of the variables. It is observed from the table that Stock returns over the period of study is maximum at 9.916 with a minimum of 7.961, averaging at 8.932 with a standard deviation of 0.692 which clearly shows that there is no much fluctuations in the Stock returns over the period of study at levels. As far as interest rate is concerned the maximum stood at 2.542 and the minimum accounted for 1.168 with an average of

1.881 over the period of study. The standard deviation worked out to 0.292, thus indicating low fluctuations as for as interest rate is concerned. The table also shows that average monthly Stock returns as 0.9 per cent and the interest rate as 0.2 per cent. However, the standard deviations of the differences in these variables indicate that interest rate is more than Stock returns. For a normal distribution, the skewness must be zero and kurtosis at three. The results show that the frequency distributions of the variables are not normal. Jarque-Bera statistics also indicates that the frequency distribution of the underlying series does not fit normal distribution.

**Table -2**  
**Correlation Analysis**

<b>Correlation Coefficient ( r ) between Interest rate and Stock returns</b>					
Series		r	t-Statistics	P-Value	Ho Hypothesis
Interest rate	Level Specification	-0.17	-2.23	0.03*	Rejected
	First Difference	-0.11	-1.47	0.14	Not Rejected

\* Implies significant at 5% level.

Table 4.3 shows the correlation analysis between interest rate and stock returns for both level specification and first difference. At level specification, the correlation relationship between interest rate and stock returns is -0.17, which is significant at five percent level. It indicates a negative relationship between the variables in a long run. There is a danger of obtaining apparently significant correlation results from unrelated data. Such correlation are said to be spurious. To avoid that, correlation analysis between the first difference variables has also been computed. At the first difference, the correlation relationship between interest rate and stock returns is -0.11, which is insignificant. It indicates that interest rate has very low negative correlation with equity returns. The results of the study indicate there is no relationship between interest rate and stock returns in India ( $r=0$ ). But one point is worth enough to bring into consideration that a high or low degree of correlation certainly does not signify or rules out causality. It simply points towards the positive or negative linear relationship that exists between the two variables. It concludes that the proportion of variation in interest rate is weakly attributed to stock returns. Since correlation analysis is not a strong analysis to make conclusion of the study of hypothesis to see the effect of interest rate on stock return, the researcher sought the help of econometric models to bring more precision to the analysis.

**Table – 3**  
**Unit Root Test**

Variables	Augmented Dickey-Fuller test Statistics			
	Null Hypothesis: Variable is Not Stationary			
	Level		First Difference	
	Constant	Constant and trend	Constant	Constant and trend
Stock Returns	-0.6675	-2.2663	-10.0411	-10.0210
Interest rate	-1.5056	-1.2374	-11.8325	-11.8356
Test Critical Value (Mac Kinnon 1996)				
1% Level	-3.4672	-4.0104	-3.4672	-4.0104
5% Level	-2.8776	-3.4354	-2.8776	-3.4354
10% Level	-2.5754	-3.1417	-2.5754	-3.1417
Variables	Phillips - Perron test Statistics			
	Null Hypothesis: Variable is Not Stationary			
	Level		First Difference	
	Constant	Constant and trend	Constant	Constant and trend
Stock Returns	-0.6227	-2.1758	-10.0274	-10.0055
Interest rate	-1.9036	-1.6700	-11.8914	-11.8921
Test Critical Value (Mac Kinnon 1996)				
1% Level	-3.4670	-4.0101	-3.4670	-4.0101
5% Level	-2.8775	-3.4351	-2.8775	-3.4351
10% Level	-2.5754	-3.1416	-2.5754	-3.1416
Variables	Kwiatkowski-Phillips-Schmidt-Lin test statistics			
	Null Hypothesis: Variable is stationary			
	Level		First Difference	
	Constant	Constant and trend	Constant	Constant and trend
Stock Returns	1.5244	0.2070	0.0931	0.0770
Interest rate	0.3977	0.1262	0.1307	0.0719
Test Critical Value (Mac Kinnon 1996)				
1% Level	0.7390	0.2160	0.7390	0.2160
5% Level	0.4630	0.1460	0.4630	0.1460
10% Level	0.3420	0.1190	0.3420	0.1190

It is essential to test the economic time series data for stationary before proceeding for Granger Causality tests. The study uses three different tests, i.e., Augmented Dickey Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski, Phillips, Schmidt. and Shin (KPSS) test for finding unit roots in time series. ADF, PP and KPSS statistics are given in Table 4.4. On the basis of ADF statistics, PP test and KPSS test both interest rate and Stock returns are found to be non-stationary at

levels and stationary at first difference which is the common phenomenon in most of the economic time series.

Further, ADF statistics and PP test rejects null hypotheses of unit root in case of first differences of interest rate and Stock returns at one percent. Finally, KPSS test is also applied which reject null hypothesis at levels and accept the null hypothesis at first difference. Assuming, interest rate and Stock returns are non-stationary at levels and stationary at first differences on the basis of ADF, PP, KPSS tests are undisputedly declared that all the variables are integrated of order one, *i.e.* I (1) .

**Table - 4**  
**Granger causality test**

Null Hypothesis	Lags	F-Statistics	Prob.	Results
Interest rate does not cause Stock Returns	2	0.83964	0.4336	ACCEPT
Stock Returns does not cause Interest rate	2	1.55499	0.2141	ACCEPT

**Table - 5**  
**Interest rate versus Equity returns**

Cause	Effect	Causality Inference	Relationship
Interest rate	Stock Returns	Interest rate does not cause Stock returns	No Relation
Stock Returns	Interest rate	Stock Returns does not cause Interest rate	No Relation

The study implement the Granger Causality test to answer whether changes in interest rate cause changes in Stock returns or changes in Stock returns cause changes in interest rate, applying order one *i.e.* I (1). Table 4.5 represents the empirical results of Granger causality test between interest rate and stock returns. The test results suggest that, fail to reject the null hypothesis of interest rate does not cause stock returns as well as the null hypothesis of Stock returns does not cause interest rate. This implies that the interest rate neither affects Stock returns nor stock returns affect the interest rate.

The study indicates that the interest rate does not cause the Stock returns. It is consistent with the results of Mok (1993), Gjerde and Sættem (1999), Mukherjee and Naka (1995) and Humpe and Macmillan, (2009). The results was also consistent with the findings of many researcher is India like Bhattacharya and Mukherjee (2002), Pratnik and Vina (2004) and the results is contrary to Mukhopadhyay and Sarkar (2003), Debabrata Mukhopadhyay and Nityananda Sarkar (2003), Ray, Pranthik and Vani Vina (2004),Lakahmi R. Nair (2008), Shahid Ahmed (2008 ). The Stock returns does not cause interest rate. It is consistent with the results of Bhattacharya and Mukherjee (2002), Shahid Ahmed (2008) and the result is contrary to Ratanapakorn and Sharma (2007). Thus, it is observed that, stock market has no relation with the growth of Interest rate in India and vice versa.

## 6. Conclusion:

The present study tried to estimate causality relationship between Interest rate and Stock returns. The impact of Interest rate and Stock returns in India is studied, by using monthly data from April 1997 to March 2014. The study finds a Short run causality observed between Interest rate and stock returns revalued the following, that there is no causality between Interest rate and stock returns. The study implies that the Interest rate neither affects Stock returns nor a Stock return affects the interest rate. Thus, the present study empirically proves, stock market has no relation with the growth of interest rate in India and vice versa.

## 7. References:

- 1) Chatrath, A., S. Ramchander and F. Song (1997), "**Stock prices, inflation and output: evidence from India**", *Applied Financial Economics*, Volume 7(4), 439-445.
- 2) Basabi bhattacharya and Jaydeep mukherjee (2002)., "**The nature of the causal relationship between stock market and macroeconomic aggregates in India: an empirical analysis**" Paper Presented in the 4<sup>th</sup> Annual Conference on Money and Finance, Mumbai.
- 3) Debabrata Mukhopadhyay and Nityananda Sarkar (2003)., "**Stock return and macroeconomic fundamentals in model specification framework: Evidence from Indian stock market**"., [www.isical.ac.in/~eru/2003-5](http://www.isical.ac.in/~eru/2003-5)
- 4) Dharmendra Singh (2010), "**Causal Relationship between Macro-Economic Variables and Stock Market: A Case Study for India**", *Pakistan Journal of Social Science*, Vol.30. No.2.
- 5) Fisher, I. (1930). "**Theory of Interest.**" MacMillan, New York.
- 6) Gagan Deep Sharma and Mandeep Mahendru (2010), "**Impact of Macro-Economic Variables On Stock Prices in India**", *Global Journal of Management and Business Research-Vol,10, Issue 7*,pg:19-26.
- 7) Golaka C. Nath and Dr. V.V. Reddy. (2004), "**Macroeconomics Indicators and Stock prices-Indian Evidence**"., *The ICFAI journal of Applied Finance*
- 8) Lekshmi R. Nair (2008), "**Macroeconomic Determinants of Stock Market Development in India**", *NSB Management Review*, Vol-1.No.1.
- 9) Naka, Mukherjee, and Tufte , (2001) "**Macro economic variables and performance of the Indian Stock Market**"., No. 1998-06, working papers from University of New Orleans, Department of Economics and Finance
- 10) Pethe, A., and Ajit Karnik, (2000), "**Do Indian Stock Markets Matter?- Stock Market Indices and Macro-economic Variables**", *Economic and Political Weekly*, 35 (5), 349-356
- 11) Raman K. Agrawalla (2008), "**Share Prices and Macroeconomic Variables in India: An Approach to Investigate the Relationship between Stock Markets and Economic Growth**", *Journal of Management Research*, year 2008, Volume :8, Issue:3.
- 12) Soumya Guha Deb and Jaydeep Mukherjee (2008), "**Does Stock Market Development Cause Economic Growth/? A Time Series Analysis for Indian Economy**". *International Research Journal of Finance and Economics*, Issue 21.
- 13) French, K. R., Schwert, G. W. and Stambaugh, R. E. (1987), "**Expected Stock Return and Volatility**", *Journal of Financial Economics*, 19, 3-29
- 14) Choi, D. and Jen, F. C. (1991), "**The Relation Between Stock Returns and Short-Term Interest Rates**", *Review of Quantitative Finance and Accounting*, Vol. 1, pp. 75-89 [Online] Available at: <http://www.springerlink.com/content/912t8815724k8881/fulltext.pdf>
- 15) Allen L., and Jagtianti J. (1997), "**Risk and market segmentation in financial intermediaries' returns**", *Journal of Financial Service Research*, 12, 159-173.
- 16) Muradoglu G., Metin K. and Argae R. 2001, "**Is there a long-run relationship between stock returns and monetary variables: evidence from an emerging market**", *Applied Financial Economics* VII(6): 641-649.
- 17) Bhanumurthy, N. R., and Agarwal, S. (2003), "**Interest Rate - Price Nexus in India**", *Indian Economic Review*, 38(2), 189–203.
- 18) Bhatt, V., and Virmani, A. (2005), "**Global integration of India's Money Market: Interest rate parity in India**", [Online] Available: <http://www.icrier.org/pdf/wp164.pdf> (February, 1, 2009)

## WEBSITES:

- 19) [www.bseindia.com](http://www.bseindia.com)
- 20) [www.rbi.org.in](http://www.rbi.org.in)
- 21) [www.sebi.gov.in](http://www.sebi.gov.in)
- 22) [www.moneycontrol.com](http://www.moneycontrol.com)
- 23) [www.yahoofinance.com](http://www.yahoofinance.com)
- 24) [www.equitymarket.com](http://www.equitymarket.com)