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Amar Rao

Abstract- This research paper study granger causality between three-month short-term interest rates and stock index prices represented by NIFTY 50 of National Stock Exchange. For the study, daily observations of prices were taken between the period of the year January 2002 to March 2019. Stationary of data was tested and confirmed by Augment Dickey-Fuller test. To determine causality between short term interest rates and stock index prices, Granger Causality test was used. Result analysis shows that there exists no causality relationship between three-month short term interest rates and stock index prices of NIFTY 50.

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I. Introduction

"Bulls make money, Bears make money, Pigs get slaughtered."

The quote mentioned above is quite relevant in today's financial markets especially equity markets. The actual meaning behind this maxim of wall street is to warn investors against greed and fear. It merely says, one has to have a view about the direction of stock prices in one way, either bullish, which is represented by bull or bearish represented by bear, if you have a sideways view or undecided about the direction of the market like pig, you will be punished by markets in terms of losing your investment. Since a long time, financial markets provide a platform for people to earn profits and build a fortune. History of stock markets can be traced back to France where it had a system of courretiees dechange who managed agricultural debts through the country on behalf of banks. As Author (Vidal, 1910)written about the system of producers, traders, merchant commission agents, brokers, money lenders in his report. He even talked about producers of transferable securities who were known as financiers who negotiated with the government who borrow money.

Active stock market history can be traced back to Belgium(Van Overfelt et al., 2009). Countries like Beuges, Flanders, Ghent, and Rotterdam in the Netherlands all hosted their stock market system in the 1400s and 1500s. *In 1602, the Dutch East India company became the first publicly traded company by releasing shares of the company on the Amsterdam Stock Exchange*[1].

The history of the capital market in India dated to the eighteenth century when the East India Company securities were traded in the country. Until the end of the nineteenth century, securities trading was unorganized, and the main trading centers were Bombay (now Mumbai) and Calcutta (now Kolkata) (Pathak Bharti). The first stock exchange was established in Bombay in 1875 with the name Native Shares and Stock Brokers Association. In 1927, Bombay stock exchange (now BSE) got recognized("bombayact_1925.pdf," n.d.) After India got independence in 1947, the size of the equity market was quite small. The controller of the capital issue was the primary regulator which micromanaged every issue like pricing, timing, interest rate, etc. Indian government enacted the Securities Regulation Act, 1956 to regulate Indian capital market but the Indian capital market was not adequately regulated and monitored until the establishment of Securities Exchange Board of India in 1992.

Indian stock market broadly consists of BSE and NSE, although regional stock exchanges are there, trading is limited. *The National Stock Exchange of India Ltd. (NSE) is the leading stock exchange in India and the second largest in the world by a number of trades in equity shares from January to June 2018, according to World Federation of Exchanges (WFE) report. NSE launched electronic screen-based trading in 1994, derivatives trading (in the form of index futures) and internet trading in 2000, which were each the first of its kind in India.*[2] Nifty is a benchmark index of NSE which consist of top 50 stock by free-float market capitalization. The flagship NIFTY 50 index is widely tracked and traded as the benchmark for Indian capital markets. The NIFTY 50 is based on the free float market capitalization methodology(NIFTY50 Equal Weight Index – Methodology Document, August 2018).

The Nifty index has a base date of November 3, 1995, and a base value of 1000. BSE Sensex and NIFTY 50 continued to scale new highs with Sensex gaining 11.3 percent and NIFTY gaining 10.2 percent respectively during the year 2017-18.

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[1] "Establishment of the Stock Market." Investify, investify.co.nz/establishment-of-the-stock-market/, Retrieved March 13, 2019,

[2] "National Stock Exchange of India Ltd." *NSE*, www.nseindia.com/global/content/about_us/about_us.htm.

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experienced high inflations and stability in monetary conditions. Their findings were mainly related to the period of high inflation and low inflation. They pointed put during the periods of high inflation; interest rates are quite relevant to explain changes in future values of inflation and stock returns whereas, under low inflation, equity investors anticipated interest rates much better.

(Narang, 2015) analysed the effect of Reserve Bank of India changes in repo rate and its effect on Nifty and Sensex. He studied specific dates and rise/fall in Nifty and Sensex, but his study was only confined to a short period, consist of only three events from 15 January 2015 to 22 June 2015. In the end, he concluded that change in repo rates create volatility in the market and if interest rate changes are favorable then both Nifty and Sensex go up and vice versa.

(Prabu A Edwin (Reserve Bank of India), Bhattacharyya Indranil (Reserve Bank of India), Ray Partha (Indian Institute of Management Calcutta, 2015) researched in their working paper, how stock returns in India impacted by announcements of monetary policy by using event study and identification through hetero-scedasticity(IH) methodology with daily data over ten year period 2004-2014. The working paper's main findings are that tightening of monetary policy leads to a decline in stock returns as results from IH are statistically insignificant which is also confirmed by the ES approach. On the other side, the authors pointed out that unanticipated policy announcements seem to have a weak impact on the stock index.

(Upadhyay, 2015)explored the causality relationship between stock returns and interest rates. The author considered weighted lending rates as a proxy for interest rates and BSE SENSEX for study. The author also gave reasons for interest rate changes such as inflationary expectations, short-term political gains, deferred consumption, the risk of investments, liquidity preferences, etc. She concluded that no causality exists, i.e., BSE SENSEX does not Granger Causality interest rates and vice versa.

II. Research Methodology

Present study focusses on whether short term interest rates represent by the three-month yield of government bond granger causality stock market index represented by a NIFTY index of National Stock Exchange. For this purpose, the null hypothesis will be

H_0: No significant impact of changes in short term interest rates on a stock market index price.

H_1: There is a significant impact of changes in short term interest rates on a stock market index price.

The examined period for testing this hypothesis is from January 2002- March 2019 and the reason for the concerned period is that global economy experienced a deceleration in growth rates and recorded an output growth of 2.4 percent during the past year. The beginning of the tenth five-year plan raised new challenges for the Indian economy at the whole. In the year 2001-02, the overall growth rate of 5.4 percent achieved supported by a growth rate of 5.7 percent in agriculture and allied sectors and 6.5 percent in services. It was a period of continued high real interest rates, and the average annual rate of inflation represented by the Wholesale Price Index (WPI) increased from 3.3 percent in 1999-2000 to 7.1 percent in 2000-01. Daily observations are taken for both i.e. short-term interest rates (three-month government bond yields) and stock market index (NIFTY) from web portal (https://in.investing.com/) which is a global financial portal consist of news, analysis, quotes, technical and fundamental data about local and global financial products such as stocks, bonds, commodities, interest rates.

NIFTY 50 index is a benchmark representation of National Stock Exchange. It represents the weighted average of twelve sectors and consists of a portfolio of blue-chip companies, i.e., the largest and most liquid Indian Securities. It consists of 50 companies out of 1600 companies listed on the NSE (August 2018). It is managed by India Index Services and Products which is a subsidiary of NSE Strategic Investment Corporation Limited. NIFTY 50 was launched in April 1996. It is a free float market capitalization weighted index. NIFTY 50 stocks represent about 65% of the total market capitalization of the National Stock Exchange. The base year for NIFTY 50 is 1995, and the base value is 1000.

Short term interest rates represent by three-month government bond yield has been taken. They are called T-Bills and comes in different maturity period of 91 days, 182 days and 364 days. T-Bills are risk-free instruments as the sovereign guarantee of government backs them. Auctions are held by Reserve Bank of India from time to time to infuse and suck out the liquidity.

Methods developed by Granger are used to test the relationship between the stock market index and short-term interest rates. First, we need to check the stationary character of observations for both stock market index price and short-term interest rates. We used the Augmented Dickey-Fuller Test for checking the stationarity of the data and finding unit roots in time series and Granger causality test for verifying the causality between the short-term Interest rate and NIFTY 50 stock market index prices.

III. Findings

Granger causality requires that the series have to be covariance stationary, so an Augmented Dickey-Fuller test has been calculated. The results of the test are given in Table 3. From the table, we can conclude that stock market index prices represented by NIFTY 50 and short-term interest rates on three-month bonds are stationary at first difference which rejects the null hypothesis in ADF test that data has a unit root.

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Table 3: Unit Root Test Results

Variables	Augmented Dickey-Fuller Test
	At First Difference (P-Value)
Three-month bond daily price	0.0000*
Nifty50 daily price	0.0000*

After confirming the stationarity of data observations, the Granger Causality test developed by Granger for examining the short-run interdependence between variables. The same test has been applied to test the hypothesis whether changes in short term interest rates cause changes in stock market index prices or vice-versa.

Figure 1: Three-month short-term interest rate time series line chart

Figure 2: NIFTY50 index daily price line chart

Figure 3: Scatter plot of three-month bond interest rates and NIFTY

Table 4: Hypothesis Testing

The results in Table 4 show that null hypothesis, i.e., no significant impact of changes in short term interest rates on stock market index price is accepted, it means three-month short-term interest rates does not Granger causality stock index prices represented by nifty as well stock index prices does not Granger causality short term interest rates. Changes in short term interest rates do not signal changes in the stock price index; it implies that past values of short-term interest rates do not contain information to predict stock market index prices and vice versa.

IV. Conclusion

Macroeconomic indicators are useful in forecasting prices of a financial asset, and these can be categorized in leading, coincident and lagging indicators while leading indicators like short term interest rates signal a change in money supply in an economy. In the spirit of same, we tested the Granger causality between three-month short term interest rates and benchmark index of National Stock Exchange and our results found out that no causality exists between these two variables.

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