Golden Research Thoughts ISSN 2231-5063
Volume-3, Issue-1, July-2013

An Empirical Investigation Of Casual Relationship Among Monetary Variables And Nse Bank Nifty Index In India

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Abstract: This study analyses the long term relationship between NSE bank index and important monetary variables for the period January 2000 to November 2011.Monetary variables included in the study are money supply , long term interest rates, foreign exchange rates and whole sale price index. The data have been examined using multivariate co integration analysis, Granger causality analysis and vector auto regression (VAR) model to analyze the nature of relationship among the variables. Johansen and Juselius' multivariate co integration analysis indicates the presence of a long-term dynamic relationship between the NSE bank nifty and monetary variables. Unidirectional Granger causality is found between monetary variables and the NSE bank nifty index. Unidirectional casual relationship is found in between foreign exchange rates and long term interest rates with bank nifty. And also found that interest rates and whole sale price index have bidirectional relationship. From the VAR analysis found that changes in foreign exchange rates and long term interest rates have negative causal effect on NSE bank Nifty. Money supply and inflation doesn't show any significant causal relationship with NSE Bank Nifty Index.

Keyword: Empirical , Variables , Casual Relationship , Analyses.

INTRODUCTION

Face of Indian Banking Services have been greatly changed by Financial sector Reforms of 1991. Before the introduction of reforms. the prevalence of reserve requirements controls on interest rates, allocation of financial resources to certain sectors increased the degree of financial repression and adversely affected the country's financial resource mobilization and allocation. Hence banks remained unprofitable, inefficient, and unsound owing to their poor lending strategy and lack of internal risk management under government ownership. Strict regulations, low interest rate on government bonds, concessional lending, administrated interest rates and lack of competition lead to deterioration of banks during 1970 - 1991.

Reforms in financial sector set in motion in 1991 have greatly changed the face of Indian Banking. Reforms has made banking sector shift gradually from a regulated environment to a deregulated market economy. These reforms aimed at increasing the presence and availability of banking services in India. It also improved the efficiency of the banking system in India.

Monetary policy is the process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability. This concept of monetary policy may be right in the context of developed economies, but in less developed countries like India, monetary policy cannot remain confined only to controlling the supply of money. RBI's responsibility is mainly to moderate the expansion of credit and money supply, in such a way as to ensure the legitimate requirements of industry & trade and curb the use of credit for unproductive and speculative purposes. Monetary variables are regulated and controlled by central bank of the country with the help of adequate policy measures. Monetary variables like interest rates, inflations, exchange rates and money supply are thus important factors to influence the performance of the banks. In order to achieve the objectives of general economy objective, our study will focus on four monetary variables namely inflation rate, interest rate, money supply and exchange rate. As we know that interest rate decides the profitability of banks and tool to increase revenue .

Inflation is important for banks because they deal with nominal financial instrument. Nominal instrument make up the bulk of bank assets and liablilities.An increase in anticipated inflation will lead to change in the behavior of investor as well as banks. Exchange rate is an important parameter for banks performance due to globalization many business organizations are operating their business in different countries. Based on the changes happening in exchange rate the flow of money can affect the financial system. Thus all these factors affect the flow of money in the country.

REVIEW OF LITERATURE

Patelis,(1997) concluded that monetary policy variables are significant predictors of stocks future returns. Nelson (1976) studied the relationship between monthly stock returns and inflation in the post-war period from 1953 to 1974 using US data, and found a negative relationship between stock returns, in both expected and unexpected inflation. Asprem (1989) found a optimistic relationship between Industrial production, money supply and stock prices and a negative effect between inflation, interest rate and stock prices. Kaul (1990) found that in countries where

there is no change in the policy regime there exists a negative relation between stock returns and changes in expected inflation. Muradoga and Argace(2001) examined the long-term relationship between stock returns and monetary variables in an emerging market through time by using the co integration technique. Results displayed no cointegrating relationship between stock prices and any of the variables or groups of variables of concern. But sometimes stock returns are co integrating along with monetary variables. They concluded that overall result is misleading for investor who would like to exploit profit opportunities. Bhattacharya and Mukherjee(2002) concluded that there is no causal relationship between Stock returns and money supply, IIP national income , foreign exchange rate , forex reserve of the country . But his study identified there is bidirectional causal relationship between stock return and inflation rate in the country. Neri (2002) concluded that contractionary monetary policy has negative impact on stock market indices. Kim(2003) studied the negative correlation between stock return and inflation which is known in the literature as stock return –inflation puzzle. Simpson and Evens (2003) study concluded that there is no evidence for co integrating relationship between Australia's bank stock market returns and short- and long-term interest rates and exchange rates over the period of study. Kholodilin and Montagnoli (2008) analyzed the response of European stock markets to the monetary policy of the central bank of Europe by using the heteroskedasticity based approach. They concluded that contractionary monetary policy has a heterogeneous impact on stocks when monetary policy announced. Hyde (2009) investigated the predictive ability of financial and macroeconomic variables for German stock and bond returns. Result showed that changes in short-term interest rates and industrial production growth (rolling window scheme) or industrial production growth and changes in oil prices (recursive scheme) have the 'best' predictive ability for stock returns.Hasan and Tariq Javed (2009) studied relationship between equity prices and monetary variables for the period June 1998 to June 2008.Monetory variables include money supply, treasury bill rates, foreign exchange rates, and the consumer price index. They found that the money supply and stock returns have positive relationship and it supports liquidity hypothesis. Interest rates shocks have negative impact on equity returns. Exchange rates have negative impact on stock returns in the short run. And also found the inflation has only little impact on stock returns. Mitra (2010) examined interest rates, output gap, inflation gap, foreign exchanges rate, stock index and foreign investments in capital markets. This study found a co integrating relationship among these variables. And also states that foreign investment in capital markets heavily influence stock prices in India. Hosseini and Ahmad (2011) examined the relationships between stock market indices and some important macroeconomics variables, crude oil price, money supply, industrial production and inflation rate in China and India. Results showed that the effect of increases in inflation on these stock indices is positive in both countries. The impact of increase in other economic variable on the stock market indices is positive in China but negative in India.

OBJECTIVE AND METHODOLOGY

It is generally found that most of the banking company stocks are expose to the volatility inspite of having good financial performance. This is due to changes in various external factors such as inflation, interest rate and foreign exchange rate .And also there large amount of fluctuation in the monetary variables like foreign exchange rates , interest rates , inflation etc.

Therefore the following are the objective of our study are.
To find out dynamic relationship between monetary variables(i.e Long term Interest rate, inflation(WPI). Foreign exchange rate (USD/INR) , money supply(M3) and Bank nifty index.
To examine the nature of relationship between monetary variables(i.e Interest rate, inflation, Foreign exchange rate) and NSE Bank nifty index in India.

RESEARCH METHODOLOGY

The study is empirical in nature. For our study the data primarily obtained from the NSE website and RBI data warehouse . The sample period consist of monthly data during the period 1.1.2000 to November 2011 to November 2011.

Our study uses one of the most established methodology for testing the nature of relationships among variables . The method used to analyse the causal relationship between the variables in the study is granger casualty test and also vector auto regression(VAR) model is applied to find the nature of relationship between. The first step of this process involves a test for stationarity; the order of integration of the variables is estimated. For this purpose, this study employs Augmented Dickey-Fuller (ADF) and Phillips-Perron Tests(PP) for Unit roots. Once the order of integration of each variable has been determined, the study perform the cointegration analysis to determine whether the time series of these variables display a stationary process in a linear combination. For this purpose, the Johansen (1991) method of multivariate cointegration is employed. If there is at least one co integrating relationship among the variables, then the causal relationship among these variables can be determined by Granger causality test and VAR model to Identify the nature of relationship. Whole set of data has been analyzed with the help of E-views software.

BANKNIFTY (Dependent variable)

The CNX bank Index(coded as BANKNIFTY) have been used in this study as the dependent variable.. Changes in bank nifty is calculated in this study is as follows

$$\Delta BANKNIFTY = logBANKNIFTY_t - logBANKNIFTY_{t-1}$$

Monetary Variables (Independent Variables)
Foreign Exchange Rate

The foreign exchange rate (Coded as Forex) is measured by employing the end-of-month US $/Rs exchange rate and the change in value is worked out through log differencing.

$$\Delta FOREX = logFOREX_t - logFOREX_{t-1}$$

ISSN 2231-5063
Volume-3, Issue-1, July-2013

Long term Interest Rate

Long-term interest rates (coded as INT) are proxied by the yield on 10-year Government of India Securities (GSEC10) .Yield on government securities are used as a proxy for the interest rate. Change is measured by log difference to Long term interest rates. Interest rate is one of the important factors to determine the bank's profitability. A change in the long term interest rates is calculated as follows.

$\Delta INT = logINT_t - logINT_{t-1}$

Inflation Rate

Inflation (coded as WPI) refers to the continuous rise in the prices of the commodities. Inflation is proxied by monthly wholesale price index quoted by RBI. Inflation is an important factor to determine the saving and investment activities in capital market as well as bank fixed deposit. Changes in the inflation is calculated as follows

$\Delta WPI = logWPI_t - logWPI_{t-1}$

Money Supply (M3)

This is the broadest measure of money; it is used by economists to estimate the entire supply of money within an economy. The category of the money supply that includes M2 as well as all large time deposits, institutional money-market funds, short-term repurchase agreements, along with other larger liquid assets. Changes in money supply is calculates as follows.

$\Delta M3 = logM3_t - logM3_{t-1}$

EMPIRICAL RESULT

Table 1 Correlation metrix.

	BANKNIFTY	FOREX	INT	M3	WPI
BANKNIFTY	1	-0.349	-0.1129	0.94619	0.94289
FOREX	-0.349	1	-0.1027	-0.1007	-0.1022
INT	-0.1129	-0.1027	1	-0.1165	-0.0771
M3	0.94619	-0.1007	-0.1165	1	0.99302
WPI	0.94289	-0.1022	-0.0771	0.99302	1

Table 1 shows the correlation matrix for BANK NIFTY, FOREX, INT, M3, WPI for during year .It is found that foreign exchange rate and long term interest rates are negatively correlated to bank nifty. The relationship between bank nifty and WPI and M3 is positive. But correlation analysis will not give clear nature or significant relationship between different variables. To avoid poor results of this study ADF and PP Unit Root Tests has been adopted.

Table 2 .ADF and PP Unit Root Test results for level series data.

Variables		ADF	PP
		t-stat	t-stat
Banknifty		-2.372783	-2.440936
INT		-1.805624	-1.851001
Forex		-1.791791	-1.816104
WPI		-2.364706	-1.946311
M3		-1.575176	-1.671115
Test critical values:	1% level	-4.023975	-4.023975
	5% level	-3.441777	-3.441777
	10% level	-3.145474	-3.145474

Table 3 .ADF and PP Unit Root Test results for first differenced data.

Variables		ADF	PP
BankNifty		-11.53987	-11.54079
INT		-11.87667	-11.87722
Forex		-9.199230	-9.210960
WPI		-7.453214	-7.478486
M3		-6.373127	-11.67389
Test critical values:	1% level	-4.024452	-4.024452
	5% level	-3.442006	-3.442006
	10% level	-3.145608	-3.145608

From the Table 2 it is very clear that all the variables are non stationary at level series .ADF test statistics and PP test statistics of bank nifty, foreign exchange rates(FOREX) and long-term interest rates(INT), money supply (M3)and whole sale price index(WPI) are less than critical values in absolute values at 1% level of significance. But in case of unit root test at first difference data (Table no.3) of bank nifty , Foreign exchange rates, long term interest rates , money supply and whole sale price index shows all variables becomes stationary. The reason is test statistics are much higher than the critical values at 1% level of significance. The reason for using two unit root test is the Dickey-Fuller test requires that the error terms be statistically independent and data homoskedastic. However, in some cases these assumptions may not be true for some data, and so this study using another important technique, the Phillips-Perron test, to test the stationarity of the time series.

Table 4 Johensens cointegration test

Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value
None *	0.210822	71.35931	68.52	76.07
At most 1	0.134259	38.68591	47.21	54.46
At most 2	0.092822	18.79049	29.68	35.65
At most 3	0.037149	5.347013	15.41	20.04
At most 4	0.000889	0.122754	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 1 cointegrating equation(s) at the 5% level
Trace test indicates no cointegration at the 1% level

Table-4 shows there is a cointegration between Bank nifty indices and monetary variables for the period January 2000 to November 2011 in the Indian capital market. The trace test indicates the presence of one cointegrating equation at the 5% level of significance. Therefore, the result provides evidence of a long-term relationship between Bank nifty Index and monetary variables.

Table 5 Pairwise Granger Causality Tests

Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
DFOREX does not Granger Cause DBANKNIFTY	140	26.0179	2.80E-10
DBANKNIFTY does not Granger Cause DFOREX	140	1.62874	0.20001
DINT does not Granger Cause DBANKNIFTY	140	5.6033	0.00459
DBANKNIFTY does not Granger Cause DINT	140	1.53082	0.22009
DM3 does not Granger Cause DBANKNIFTY	140	0.40288	0.66919
DBANKNIFTY does not Granger Cause DM3	140	0.07914	0.92395
DWPI does not Granger Cause DBANKNIFTY	140	0.37349	0.68904
DBANKNIFTY does not Granger Cause DWPI	140	3.82246	0.02428
DINT does not Granger Cause DFOREX	140	0.47659	0.62194
DFOREX does not Granger Cause DINT	140	0.94434	0.39149
DM3 does not Granger Cause DFOREX	140	0.60873	0.54553
DFOREX does not Granger Cause DM3	140	0.25686	0.77385
DWPI does not Granger Cause DFOREX	140	0.50484	0.60474
DFOREX does not Granger Cause DWPI	140	1.42905	0.24314
DM3 does not Granger Cause DINT	140	0.31061	0.73352
DINT does not Granger Cause DM3	140	0.01134	0.98873
DWPI does not Granger Cause DINT	140	3.77934	0.02529
DINT does not Granger Cause DWPI		4.9838	0.00816
DWPI does not Granger Cause DM3	140	2.56669	0.08053
DM3 does not Granger Cause DWPI	140	1.29687	0.27677

From the Table no. 5 it is very clear that foreign exchange rates and long term interest rates have unidirectional granger causal relation with bank nifty. Inflation (WPI) and long term interest rates have bidirectional causal relationship. Since the P values are less than 5%, we reject the null hypothesis.

DFOREX does not Granger Cause DBANKNIFTY ,DINT does not Granger Cause DBANKNIFTY, DWPI does not Granger Cause DINT and DINT does not Granger Cause DWPI.

To find out the nature of causal relationship and the impact of changes in each variable with other variables in the study Vector auto regression methods (VAR) has been applied in the study. In this model each variables in the study consider as dependent variables and trying to find the impact of changes in one variable in different lags to other variables.

The following table shows the coefficients of each variables and its relation to other variables.

VAR model results.

	Dependent Variable Banknifty		Dependent Variable Forex		Dependent Variable INT		Dependent Variable M3		Dependent Variable WPI	
	Coefficient	P-val	Coefficient	P-val	Coefficient	P-val	Coefficient	P-val	Coefficient	P-val
Intercept	0.038418	0.0281	-0.001019	0.7899	-0.004113	0.6614	0.015650	0.0000	0.002041	0.0768
ΔBN_{t-1}	-0.107358	0.2098	0.007704	0.6810	0.063033	0.1711	-0.009571	0.3500	0.011437	0.0431
ΔFX_{t-1}	-2.793142	**0.0000**	0.229806	0.0116	-0.068334	0.7593	0.011160	0.8220	-0.002176	0.9366
ΔINT_{t-1}	-0.454469	**0.0064**	0.003487	0.9237	-0.039499	0.6587	0.015113	0.4475	0.030431	**0.0057**
$\Delta M3_{t-1}$	-0.793840	0.2870	0.155883	0.3397	0.013888	0.9724	0.024624	0.7824	0.050079	0.3087
ΔWPI_{t-1}	1.214120	0.3440	0.214707	0.4448	1.989724	**0.0040**	-0.355010	**0.0210**	0.361038	0.0000
ΔBN_{t-2}	-0.028659	0.6965	-0.026743	0.0969	-0.024967	0.5277	0.002030	0.8174	-0.010291	**0.0341**
ΔFX_{t-2}	-0.950693	**0.0511**	-0.043003	0.6867	-0.095248	0.7160	-0.064169	0.2707	0.018593	0.5627
ΔINT_{t-2}	0.321329	**0.0607**	-0.049761	0.1844	0.095041	0.3019	0.014224	0.7824	0.030894	**0.0064**
$\Delta M3_{t-2}$	-0.464685	0.5238	-0.146835	0.3578	-0.373079	0.3415	-0.058437	0.5029	0.051940	0.2804
ΔWPI_{t-2}	0.932075	0.4762	0.245370	0.3919	-0.550563	0.4341	-0.039215	0.8022	-0.053089	0.5386

When bank nifty is considered as dependent variable, changes in the foreign exchange rates and interest rates have negative impact on bank nifty at very high significant level. But Foreign exchange rates are not at all influence by any of these variables, it is influenced only by its own changes happened previous period. When we considering the long term interest rates as dependent variable, the changes in interest rates largely influenced by changes in inflation, means that whenever there is any increase in inflation it will lead to positive upward movement of interest rates. Other variable in the study doesn't have any impact on interest rates. While money supply largely affecting by changes in whole sale price index, when there is an increase in inflation it will lead to negative growth or less money supply. Changes in other variables except inflation don't have any impact on money supply. When we consider inflation as dependent variable, changes in interest rate have positive impact on inflation and a positive change in bank nifty have negative impact on inflation.

CONCLUSION.

Economic health of a country is largely depending on the financial health of the banking companies. As banks stocks have high importance in the Indian capital market as well as its has crucial importance to financial sectors .This study tries to investigate relationship between NSE bank nifty and four important monetary variables namely long term interest rates, foreign exchange rates, money supply and inflation.

Because of time series nature of all the variables in the study , this study has applied unit root test to analyse the stationarity , it is found all the variables in the study are non stationary at level and it becomes stationary after first differencing. Johansens's methodology of multivariate cointegration analysis has been applied on monthly time series data to examine the dynamic long run association between monetary variables and NSE bank index in India and found that there is a long run association between these variables. Causality test found that long term interest rates and foreign exchange rates have unidirectional causal impact on bank nifty. But interest rates and whole sale price index have bidirectional causal relation. Vector Auto regression analysis test found that increase in foreign exchange rates and interest rates has negative impact on bank nifty. An

increase in inflation leads to positive movement in interest rates and negative growth in money supply. These study concludes that changes in monetary variables like foreign exchange rates and interest rate have significant influence on bank nifty and but changes in inflation and money supply doesn't have any significant influence on the bank nifty in India. The foreign exchange rate are very important to Indian banks because many of Indian banks are highly exposed to giving finance to multinational companies and also Indian capital market are highly influenced by foreign institutional investors. Interest rates are crucial for each bank, because its profitability largely depends on interest earned and interest paid.

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ISSN 2231-5063
Volume-3, Issue-1, July-2013

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