Granger-causality between macroeconomic variables and stock market index: evidence from India

Quadri, Syed and Masih, Mansur

INCEIF, Malaysia, Business School, Universiti Kuala Lumpur, Kuala Lumpur, Malaysia

25 February 2017

Granger-causality between macroeconomic variables and stock market index: evidence from India

Syed Quadri[1] and Mansur Masih[2]

Abstract

The focus of the study is on the Granger-causality between stock index and macroeconomic variables in India. The relationship between macroeconomic variables and stock market returns is, by now, well-documented in the literature. In this paper we examine the long-term equilibrium relationships and Granger-causality between selected macroeconomic variables on the Mumbai Stock Exchange BSE100 Index. The standard time series techniques are applied. The paper identifies a cointegrating relationship along with the identification of the exogeneity(leading) and endogeneity(following) of the variables. The Granger-causal chain evidenced in the findings tend to indicate that the stock index is the most endogenous(dependent) variable driven by market capitalization, inflation rate, interest rate and exchange rate. The Granger-causal chain Implications of the findings are immense for the policy makers. Also the findings of this paper present an opportunity to further expand the research in this field as well as extend it to other emerging economies like India.

Keywords: Granger-causality, macroeconomic variables, stock market, India

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[1] INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia.

2 **Corresponding author**, Senior Professor, UniKL Business School, 50300, Kuala Lumpur, Malaysia.

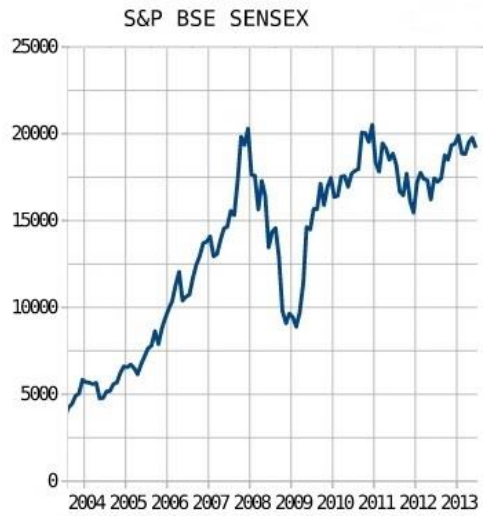
Email: mansurmasih@unikl.edu.my

Introduction

There have been radical changes in the Indian Stock Market in the last two decades subsequent to the 'opening up" of the economy in 1991 and even though the market has grown dramatically, the economic condition remains dynamic. Here while observing stock market behaviour we have taken into consideration Mumbai Stock Exchange (formerly known as Bombay Stock Exchange) sensitive index, BSE100 in our database. Why have such profound changes come about in the 1980s and 1990s? There are a number of possibilities. First, most emerging economies have been in a period of economic expansion since the early 1980s, following the steep worldwide recession of 1980-1982. Secondly, by the early 1980s, a process of financial liberalization had been undertaken in most emerging economies; different types of barriers have been lowered and competition had been intensified. At the heart of this process was the LPG Model (Liberalization, Privatization and Globalization), which stimulated stock market activity by expanding the supply of shares. A third factor was the higher returns on investing in emerging stock markets relative to developed markets. High returns attracted more domestic and foreign participants. These factors have profoundly affected emerging stock markets. Although there is a growing body of theoretical and empirical literature on the role of the financial sector and stock market developments in economic growth, stock market growth and expansion has not been investigated comprehensively, particularly for emerging markets. In addition, the causal links between stock markets and economic performance have not been examined in a time series framework for emerging stock markets. This may be explained by a lack of suitable data.

The focus of this paper is on the India's main Mumbai Stock Index and the major macro economic variables for a period of more than 9 years subsequent to the recession which affected most parts of the world in 2003. Another reason is that the stock index in focus, BSE100 also began growing at a rapid pace after 2004. The Indian economy as an emerging country has been in the phase of transformation from agro based to industrial/service based. The economy has been plagued by innumerable economic problems both inbred as well as by global events. The Mumbai Stock Index is the premier Capital Market Index in the country and the major capital formulation and Investment Avenue in the country. The Mumbai Stock Exchange is the 11^{th} largest stock exchange in the world by market capitalization as on 31 December 2012. The Mumbai Stock Exchange National Index was renamed BSE-100 Index from 14 October 1996 and since then, it is being calculated taking into consideration the

prices of stocks listed at the Mumbai Stock Exchange. The need of the study in this particular paper has arisen from the surprising fluctuations in the BSE 100 index and other macroeconomic figures for India. Steadily growing from 2004, the BSE 100 index reached the all-time high in January 2008 and crashed in the subsequent year. This cycle was repeated again in 2011 when the BSE 100 index crossed the January 2008 high and then again fell in the next year, although the decline was not the same as seen in 2009.



This paper makes an attempt to explore a previously unchartered territory on the cointegrating relationship between the variables in the Indian economy and the Stock Market. There will be two techniques used to investigate the empirical association between stock market growth and real activity. These techniques are the Johansen cointegration test and the Granger causality test. The following section contains a brief overview of the theoretical and empirical literature that point to the causal link between financial sector development and the economic performance indicators. Next, there is a summary of information on stock market growth and other relevant variables. Then, the time series properties of the variables used will be examined. The next section contains a discussion of the tests for cointegration between stock market indicators and the real sector performance. Following that, an examination is made of the causality issue between both stock market indicators and relevant variables.

Literature review: Emerging stock markets have stepped up their global participation after the 1980s and are playing an active role in the global capital markets. It is a point of endless debate that the local economy factors play the anchor role in the equity returns rather than the global factors. Under this broader framework Bilson, Brailsford, and Hooper (1999) made an

attempt to address this question *"Whether macroeconomic variables may proxy for local risk sources"*. They found moderate evidence to support this hypothesis. Furthering their research in search of some commonality patterns in emerging market return, their results found little evidence when the markets were considered collectively. However on the regional level considerable traces of commonality was shown.

Maysami and Sims (2002, 2001a, 2001b) employed the Error-Correction Modeling technique to examine the relationship between macroeconomic variables and stock returns in Hong Kong and Singapore (Maysami and Sim, 2002b), Malaysia and Thailand (Maysami and Sim 2001a), and Japan and Korea (Maysami and Sim 2001b). Maysami and Koh (2000) in a similar attempt concluded that such relationships do exist in Singapore. They found that inflation, money supply growth, changes in short- and long-term interest rate and variations in exchange rate formed a cointegrating relation with changes in Singapore's stock market levels. Chong and Koh's (2003) in a further study concluded with the same results showing that stock prices, economic activities, real interest rates and real money balances in Malaysia were linked in the long run both in the pre- and post capital control sub periods.

Gunasekarage, Pisedtasalasai and Power (2004) examined the influence of macroeconomic variables on stock market equity values in Sri Lanka, using the Colombo All Share price index to represent the stock market and (1) the money supply, (2) the treasury bill rate (as a measure of interest rates), (3) the consumer price index (as a measure of inflation), and (4) the exchange rate as macroeconomic variables. With monthly data for the 17-year period from January 1985 to December 2001 and using unit root tests, cointegration, and VECM, they examined both long-run and short-run relationships between the stock market index and the economic variables. The VECM analysis provided support for the argument that the lagged values of macroeconomic variables such as the consumer price index, the money supply and the Treasury bill rate have a significant influence on the stock market.

Vuyyuri (2005) investigated the cointegrating relationship and the causality between the financial and the real sectors of the Indian economy using monthly observations from 1992 through December 2002. The financial variables used were interest rates, inflation rate, exchange rate, stock return, and real sector was proxied by industrial productivity. Johansen (1988) multivariate cointegration test supported the long-run equilibrium relationship

between the financial sector and the real sector, and the Granger test showed unidirectional Granger causality between the financial sector and real sector of the economy.

The Theories:

Economic theory postulates that interest rates, inflation, price level, and money supply and market capitalization and other factors are important variables in developing a comprehensive understanding of the behavior of stock prices and index movements.

Exchange Rates - Traditional economic models argue that changes in exchange rates affect balance sheet items of a firm through its competitiveness as expressed in foreign currency and ultimately, profits and equity leading to price adjustments in the capital markets. This volatility in price adjustments of individual firms leads to the impact on the index. Ghartey (1998), Meese and Rogoff (1983), and Wolff (1988) have found some relationship between macroeconomic variables and exchange rates.

Another theoretical argument in the relationship between stock prices and exchange rates is the portfolio adjustment approach. According to this theory, portfolio adjustments [movements in the foreign capital- inflows and outflows of foreign capital] occur whenever there is a change in the stock prices. If stock prices are on the increase, they will attract more foreign capital. However, a decline in the stock prices will result in diminished corporate wealth leading to the reduction in the country's wealth.

Inflation – Several studies provide a negative relationship between real stock returns and inflation for US and European stock markets Linter (1975), Fama (1981, 1982), Fama and Schwert (1977) and Caporale and Jung (1997) for US financial market and Wahlroos and Berglund (1986) and Asprem (1989) provide for European markets. Chatrath and Ramchander (1997) and Hu and Willett (2000) provide evidence for Indian financial market. Keeping in mind these empirical findings we carry on with the theoretical framework of a negative relationship between the Inflation and the stock prices.

Cost of Money - Friedman and Schwartz (1963) explained the relationship between money supply and stock returns by simply hypothesizing that the growth rate of money supply would affect the aggregate economy and hence the expected stock returns. The growth of money supply is directly related to the cost of money. The cost of money has been represented by the

3 month Mumbai Inter Bank Offered Rate (MIBOR). The index on theoretical grounds has a negative relationship. As a decrease in cost of borrowing would lead to increased leveraging thus resulting in a price surge.

An increase in M2 growth would indicate excess liquidity available for buying securities, resulting in higher security prices. Empirically, Hamburger and Kochin (1972) and Kraft and Kraft (1977) found a strong linkage between the two variables, while Cooper (1974) and Nozar and Taylor (1988) found no relation.

Market capitalization – There is no solid theoretical foundations on the relation between the market capitalization and the other variables. With the mathematical breakdown of the market capitalization, it represents a possible causal relationship with the index value.

Data and Methodology

Data

The data for the subsequent research is spread over monthly observations for 114 months starting with 2004 M5. The data for the variables has mainly been sourced from the Datastream system.

All variables were taken in their level form, and for their log form, for running identification tests their difference log forms have been taken in account. The basic statistics of the data are presented in Table 1,

	BSE100	***CPI***	**Exchange Rate (1USD= XINR)**	**Market Capitalization (in Billions)**	***MIBOR***
Mean	4362.0918	8.1333	47.0399	1001.1284	7.6046
Standard Deviation	1410.3751	3.0357	5.0633	392.9878	1.9618
Minimum	1464.7000	2.2300	39.3556	230.1300	4.1800
Maximum	6469.4800	16.2200	63.7778	1817.9700	12.3200

Table 1. Basic Statistical Measures for Variables

Methodology

In the model for this paper the examination of the dynamic relations between macroeconomic variables related to the Mumbai Stock Index may be undertaken through either Engle and Granger (1987) or Johansen and Juselius (1990) protocols. While Engle and Granger's (1987) two-step error correction model may be used in a multivariate context, the Johansen's (1990) VECM yields more efficient estimators of cointegrating vectors. This is because the Johansen's (1990) VECM is a full information maximum likelihood estimation model, which allows for testing cointegration in a whole system of equations in one step, without requiring a specific variable to be normalized.

The model in this paper does not finish at the VECM stage but takes it one step further into Variance Decomposition techniques for analyzing the leading and the follower variable with culminating in the Persistence Profiling with system wide shocks and in Impulse response function using Generalized Impulse Response function to further refine the explanation of the linkage.

Empirical Results

Unit Root Test: Time series data are often assumed to be non-stationary and thus it is necessary to perform a pretest to ensure there is a stationary cointegrating relationship among variables to avoid the problem of spurious regression. Based on the error correction mechanism as indicated by Johansen (1990), it is necessary for the variables to be of the same order of integration.

The tests for stationarity or unit roots employ the augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) test performed on the variables in levels and first differences. This paper utilizes the ADF test for testing the unit root. ***ADF tests with null hypothesis of existence of unit root, which implies the variable, is non-stationary***. The results for the level form variables are represented in Table 2.

	t statistic	95% critical value	Null Hypothesis	Result
BSE100	-2.6966	-3.4515	Accepted	Non -Stationary
Exchange Rate	-2.0948 (AIC) -2.2533 (SBC)	-3.4515	Accepted	Non -Stationary
Market Cap.	-2.1623	-3.4515	Accepted	Non -Stationary
Inflation	-2.2377 (AIC) -2.6750 (SBC)	-3.4515	Accepted	Non -Stationary
MIBOR	-2.5826 (AIC) -2.2417 (SBC)	-3.4515	Accepted	Non -Stationary

Table 2: Level log form ADF Output

In the level log form all the variables represent a lower t statistic, thus accepting the null hypothesis, that there is unit root. At 5 % significance level all variables are non stationary.

For the differenced form of the log variables, as represented in Table 3, the t statistics are significant than the 5 % significance value and thus the null hypothesis is rejected and the alternate hypothesis of no unit root accepted.

	t statistic	95% critical value	Null Hypothesis	Result
Index	-7.0455	-2.8884	Rejected	Stationary
Exchange Rate	-6.9002	-2.8884	Rejected	Stationary
Market Cap.	-6.9835	-2.8884	Rejected	Stationary
Inflation	-8.6325	-2.8884	Rejected	Stationary
MIBOR	-4.8005 (AIC) -6.8102 (SBC)	-2.8884	Rejected	Stationary

Table 3: Differenced log form ADF Output

Order of VAR: The next empirical result is the determination of the Order of VAR model. The differenced log form of variables is taken in consideration, due to their stationary characteristic. The unrestricted VAR post estimation menu with an arbitrarily high order of 6 for estimation, gives a varying result for Alkaline Information Criterion and Schwarz Bayesian Criterion.

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Test Statistics and Choice Criteria for Selecting the Order of the VAR Model
*****************************************************************************
 Based on 107 observations from    8 to  114. Order of VAR = 6
 List of variables included in the unrestricted VAR:
 DBSE100         DCPI            DXE             DMCAP           DMIBOR
 List of deterministic and/or exogenous variables:
 CONS
*****************************************************************************
 Order     LL         AIC       SBC              LR test         Adjusted LR test
                                                   ------              ------
   6    992.8429   837.8429  630.6987
   5    983.9808   853.9808  680.2470  CHSQ( 25)=  17.7241[.854]   12.5891[.981]
   4    967.8597   862.8597  722.5362  CHSQ( 50)=  49.9664[.475]   35.4901[.940]
   3    949.1685   869.1685  762.2553  CHSQ( 75)=  87.3488[.156]   62.0421[.858]
   2    926.0820   871.0820  797.5792  CHSQ(100)= 133.5218[.014]   94.8379[.627]
   1    909.4674   879.4674  839.3750  CHSQ(125)= 166.7509[.007]  118.4399[.648]
   0    695.1989   690.1989  683.5169  CHSQ(150)= 595.2879[.000]  422.8213[.000]
*****************************************************************************
 AIC=Akaike Information Criterion     SBC=Schwarz Bayesian Criterion
```

Table 4. Test Statistics and Choice Criteria for Selecting the Order of the VAR Model

As per the table above, results show that AIC and SBC favors one lag. Although the test shows these results we will move further in with the study using ***2 lags*** because using a lower order, we may encounter the effects of serial correlation. The amount of data points available taken into consideration allow us to go ahead with ***VAR order of 2.***

Cointegration Result: After establishing that the variables are I(1) and determining the VAR order as 2, we can proceed to test for cointegration. Cointegration implies that the relationship among the variables is not spurious i.e. there is a theoretical relationship among the variables and that they are in equilibrium in the long run. Employing the Cointegration LR Test Based on Maximal Eigen value, the results imply that there exists one cointegrating relationship at 5 % significance level between the variables.

Null Hypothesis	Alternate Hypothesis	Statistic	95% Critical Value	90% Critical Value	Conclusion
r= 0	r=1	42.3523	37.8600	35.0400	Reject Null Hypothesis Accept Alternate
r=1	r=2	25.9220	31.7900	29.1300	Accept Null Hypothesis Reject Alternate

Table 5: Cointegration Test Results based on Test of Maximal Eigenvalue

The Trace test also indicates 1 cointegrating vector (results in Appendix). Therefore, we select one cointegrating vector based on the Eigen value and trace test Statistics at 95% level. The underlying VAR model is of order 2. From the result shown above, we are inclined to believe that there is one cointegrating vector based on intuition as well as familiarity. In some way or other, to varying degrees, based on the above statistical result as well as our insight, for the purpose of this study, we shall assume that there is one cointegrating vector, or relationship.

Statistically, the above results indicate that the variables we have chosen in some combination result in a stationary error term. The economic interpretation, in our view, is that the 5 variables are theoretically related, in that they tend to move together in the long run. In other words the 5 variables are cointegrated. That is their relationship to one another is not merely spurious or by chances. The above is based on the Johansen method. Alternatively we have used the Engle- Granger method.

Long Run Structural Modeling: With the confirmation of one cointegrating relationship amongst the variables, verifying the theoretical foundation as earlier discussed of the linkages between the variables of one strong cointegrating relationship. Arising from the theoretical base the Stock Index value is normalized in the Long Run Structuring model. Uptil now we have run under the assumption that all variables are endogenous. With the identifying restriction of A1=1 (A1 is Index) the results as expressed in Table 6, conclusion is reached that Inflation, is insignificant. Since the T ratio of Capitalization, Exchange Rate and MIBOR are significant, showing that these variables do affect the normalized variable (INDEX), albeit in an inverse manner, so we keep this variable in the equation.

	Inflation	Capitalization	Exchange Rate	MIBOR
T Ratio	-0.67920	-6.5131	-2.3009	-2.0338

Table 6: T ratio with Identifying restriction of A1 = 1

To further test the significance of variables to conclude which variables need to be kept in the equation and which may be dropped without impacting the equation, we implement the over identifying restriction on Inflation to check whether it is really insignificant (as represented in Table 6). The over identifying restriction applied is A2 = 0. The results indicate that the null restriction of zero inflation stands. However, based on the evidence of a significant

cointegrating relationship as well as strong theoretical reason, we proceed with Panel A for the remainder of the analysis.

Table 6a: Exact and over identifying restrictions on the Cointegrating vector

	PANEL A	PANEL B
BSE100	1	1
	(None)	(None)
CPI	-0.077368	0.00
	(.11391)	(None)
XE	-1.2485	-1.4633
	(.5426)	(.35439)
MCAP	-0.86345	-0.92585
	-0.13257	(.076535)
MIBOR	-0.24699	-0.18299
	-0.12144	(.053297)
TREND	0.0033382	0.0036919
	(.0021167)	(.0016696)
Chi-Square	(None)	.71648[.397]

Vector Error Correction Model: The vector error correction model allows us to identify that which variables are exogenous and which are endogenous. The vector error correction model can be employed by interpreting of the coefficient where if the error-correction coefficient in any equation is insignificant, that implies that the corresponding dependent variable of that equation is 'exogenous. We have taken the approach of interpreting the probability numbers and the t-ratio.

The null hypothesis states that all the variables are exogenous and the alternate stating that the variable is endogenous. At a 5 % confidence level, if the Probability is higher than 0.05 it means that we would be making a greater error in rejecting the Null hypothesis, and thus we accept the Null Hypothesis. The Error Correction Model given in Table 7 and the resultant probability for the variables is summarized in the Table 7.

Table 7a: (Standard errors are given in parenthesis. * indicates significance at 5%level or less)

Dependent Variable	BSE100	MCAP	CPI	MIBOR	XE
BSE100	-0.06884	-0.090154	-0.35102	-0.21428	-0.071581
	(.030395)	(.13337)	(.17169)	(.10069)	(.023822)
MCAP	0.77000	0.50023	0.17492	0.2287	-0.10269
	(.036435)	(.15987)	(.20581)	(.12070)	(0.028555)
CPI	0.029013	-0.058186	-0.0060922	-0.067332	0.012009
	(.017163)	(.075310)	(.096950)	(.056859)	(.013452)
MIBOR	-0.057667	-0.13296	-0.02915	0.13101	-0.030409
	(.026824)	(.11770)	(.15152)	(.088863)	(0.21023)
XE	0.071993	0.75493	0.016322	0.17148	0.10992
	(.10972)	(.48142)	(.61976)	(.36348)	(.085989)
ECM(-1)	-0.039568	0.28502	0.34581	0.5397*	0.034645
	(.033921)	(.14884)	(.19160)	(.11237)	(.026585)
Chi-square SC(1)	.17307[.677]	.54135[.462]	0.077772[.780]	.011598[.914]	.35688[.550]
Chi-square FF(1)	.021089[.885]	1.3578[.244]	.38283[.536]	4.24951[.039]	.86441[.353]
Chi-square N (1)	.033843[.983]	17.1323[.000]	11.2205[.004]	9.1067[.011]	1.4337[.4888]
Chi-square Het(1)	.71799[.397]	5.6489[.017]	.44386[.505]	1.6171[.203]	5.8580[.016]

	Null Hypothesis	Alternate Hypothesis	Probability	Conclusion
BSE Index	**Variable is Exogenous**	Variable is Endogenous	0.246	Accept Null
Inflation	**Variable is Exogenous**	Variable is Endogenous	0.074	Accept Null
Exchange Rate	**Variable is Exogenous**	Variable is Endogenous	0.195	Accept Null
MIBOR	Variable is Exogenous	**Variable is Endogenous**	0.000	Reject Null
Market Cap.	**Variable is Exogenous**	Variable is Endogenous	0.058	Accept Null

Table 7b: Probability Values for error in rejecting the Null Hypothesis

From the table we are able to interpret that the variables, BSE Index, Inflation, Exchange Rate and Market Capitalization have a higher probability which translates, that a higher error would be made if the Null is rejected. In this case we accept the Null Hypothesis, which means the BSE Index, Inflation, Exchange Rate and Market Capitalization are exogenous variables. The VECM, however, cannot tell us the relative degree of endogeneity or

exogeneity among the variables. Another point to be noted here is Market Cap is just slightly above 5% level but we proceed with our study treating it as exogenous based on our intuition that it will affect other variables. With the exception for Normality test for MCAP, MIBOR and CPI and Heteroscedasticity test for MCAP and XE, other diagnostics show that the 5 VECM are well specified.

Variance Decompositions: The Variance Decomposition Method, decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks (or innovations) in each variable in the system including its own. The relative exogeneity/endogeneity of a variable can be determined by the proportion of the variance explained by its own past shocks. The variable which is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all.

	XE	BSE100	MCAP	CPI	MIBOR
XE	**0.31885**	0.095377	0.538869	0.046588	0.000316
BSE100	0.000485	**0.053542**	0.906963	0.007575	0.031434
MCAP	0.032984	0.000604	**0.916412**	0.017202	0.032798
CPI	0.001625	4.48E-05	0.030353	**0.869293**	0.098683
MIBOR	0.245524	0.041811	0.218837	0.06484	**0.428988**

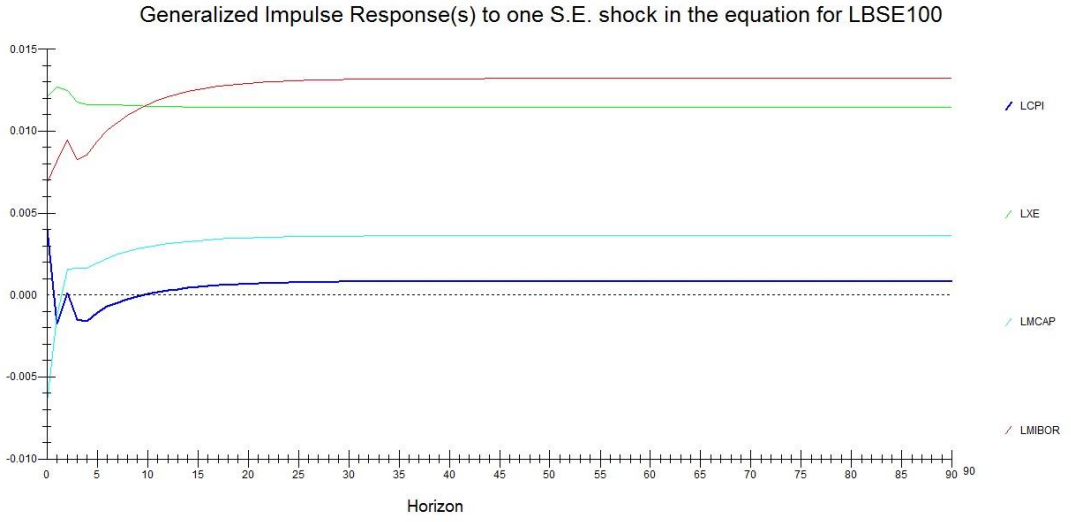
Table 8: Generalized Forecast Error Variance Decomposition (Shocked Variable in Left Column)

Table 8, gives the grid for the results of the forecast errors decomposed to the time horizon of 90 months. The results for time horizon of 36 and 72 months are given in the appendix. With the individual shock being provided to variables in left column the table represents how much of the variable is explained by its own past and by other variables.

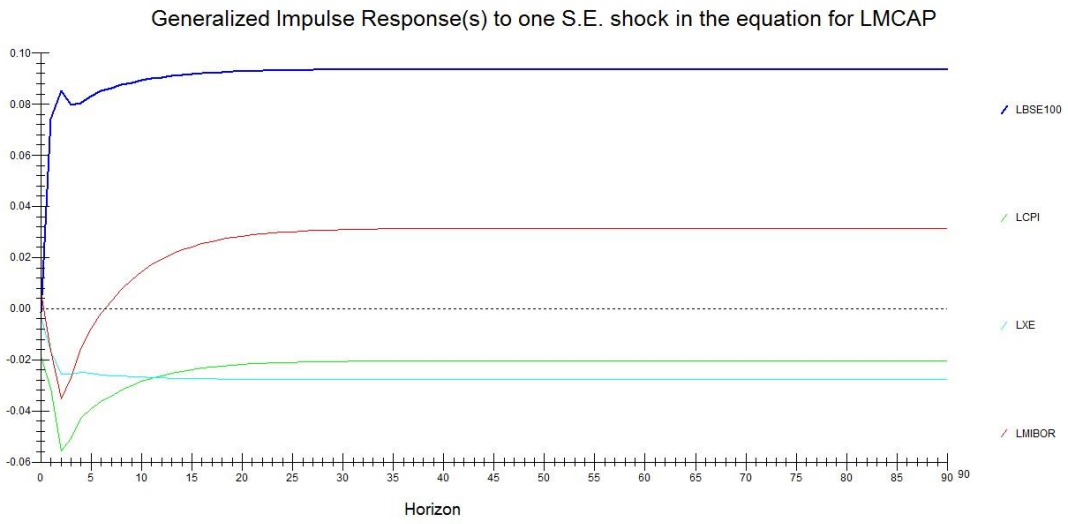
The variance for Market Capitalization is highly explained by its own past, with over 91 % of its variance explained by its own self. As earlier identified in VECM, all variables except MIBOR are exogenous but the above Table shows us that the most endogenous variable is BSE100. This scenario can arise and is explained by the fact that VECM is based on testing the data in the sample period whereas the VDC decomposes the variance of the forecast error and the forecasted values can be different from the past values. The rankings based on 36, 72 and 90 month forecast horizon using the Generalized Forecast Error Variance Decomposition are:

	36	72	90
1	MCAP	MCAP	MCAP
2	CPI	CPI	CPI
3	MIBOR	MIBOR	MIBOR
4	XE	XE	XE
5	BSE100	BSE100	BSE100

Impulse Response Functions: The information that has been tabulated in VDC can be equivalently represented by Impulse Response Functions. IRFs essentially map out the dynamic response path of a variable owing to a one-period standard deviation shock to another variable. The IRFs are normalized such that zero represents the steady-state value of the response variable. Let us see here the impact of the shock to MCAP and BSE100 and its effect on the other variables. A shock to MCAP should impact the other variables whereas impact to BSE100 should have least impact on other variables under consideration.

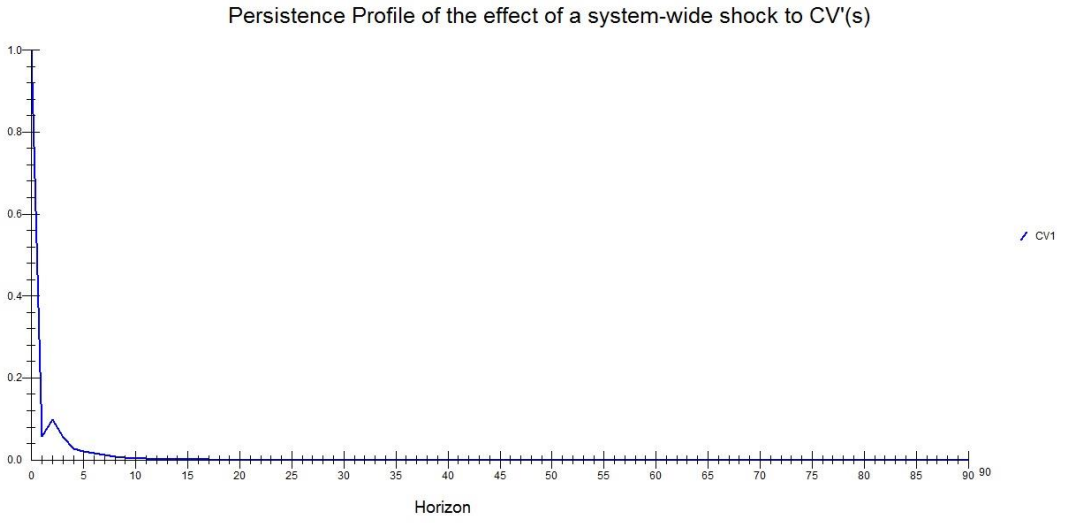


The above IRF for BSE100 shows that it affects the MCAP and Inflation the least as these are the exogenous variables.



The above IRF for one period standard deviation shock to Market Capitalization shows that all the variables are affected and the BSE100 is affected the most.

Persistence Profile: The persistence profiles traces out the effects of a system-wide shock on the long-run relations in an equation. In difference with the Impulse Response Function which is variable specific shock, it indicates the time horizon that it takes to get back to equilibrium for a system wide shock.



In our model the persistence profile represents that it takes ten months for the equilibrium to be achieved again after a system wide shock.

Conclusion

The paper examined the relationship between macroeconomic variables and the Mumbai Stock Index for a period of nearly 10 years. The theoretical foundation of interlinkages between the macroeconomic factors and the BSE 100 Index has been reiteriated by the findings.

The conclusion achieved is the strong presence of one main cointegrating relationship between the variables under study. Amongst the variables in the paper, we have examined that a high level of exogeneity has been identified in Market Capitalization, MIBOR (representing cost of money) and the Inflation. The variable BSE100 is found to be endogenous variable. A surprising observation has been that the exchange rate only explains a very small percentage of the variance of the Index which is unlike the general perception of the industry, since India is an emerging economy with heavy reliance on Foreign Investments in both real sector as well as portfolio Investments.

The conclusions drawn from the study is targeted to expand the academic debate into the relationship between macroeconomic variables and the Stock Pricing. The presence of a cointegrating relationship between macroeconomic variables and stock prices brings about a major concern for macroeconomic policy maker, and they may need to reevaluate their economic policy if affecting the stock market is not something they desire. The results represent that there may be impact of the major policy shifts on the Stock Index violating the Efficient Market Hypothesis thus creating inefficiencies.

The results and the model in this study can be extended to include further variables and multiple equations as well to increase the time period under observation. The extension to other emerging economies would be a worthwhile effort as the relationship between macroeconomic economic variables and stock index is widely documented but is not universally shown or accepted in empirical research.

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