Testing for Causality between Macroeconomic Variables and Stock Market Development of India: An Empirical Exploration

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Abstract

The paper examines the linkages among select macroeconomic variables and Stock Market Development (SMD) of India during 1988 to 2016. Using Cointegration modeling and other econometric tests the causal long-run and dynamic short-run associations among the variables have been identified. The findings substantiate that all the selected test variables have significant contributions towards Indian SMD. But individually they fail to propel any improvement in the market as most of them are not pair-wise cointegrated in the long-run. The same situation prevails in the short-run as the variables individually are not vibrant enough to create any major impact in the short-run.

Keywords: Causal relationship, Cointegration Modeling, Macroeconomic Variables, Stock Market Development (SMD).

1. Introduction

Stock market development (SMD) is believed to be an indicator of economic development of any nation. Since the last fifteen years the financial markets have matured considerably in the developed, developing and emerging market economies. Better fundamentals with stable economic growth, implementation of liberalization, privatization and globalization policies have aided in their growth. Globalization has also helped in ushering tighter association among financial markets with greater commercial presence of foreign financial institutions (FIIs) around the world. It has been experienced that, since 1990s capital inflows in different countries have

drastically changed with bank lending being replaced mostly by institutional finance especially Foreign Direct Investment (FDI) and foreign portfolio investment (FPI). The emerging market economies have also received wider acclamation from the institutional investors who have helped in transforming their financial markets characterized by the migration of securities market activities abroad. Moreover, technological advancements have furthermore accelerated the process of globalization in the equity markets linking them more robustly. It is perceived that the more resourceful the stock market of any country, the matured is the economy; and contrarily, the sound the economy, the developed is the stock market. The degree of responsiveness of the stock market to the changes in macroeconomic variables of an economy is a measure of SMD of that economy. This measure, along with many more, is used for both policy formulation and to gauge the performance of the government. Hence, stock market is also regarded as the 'barometer' of any economy. In this globalized era, where the stock markets around the world are cointegrated to each other, having an efficient stock market as a significant component of capital market is becoming a sine-qua-non to the attainment of higher level of economic growth. Understanding this inter-relationship between macroeconomic variables and SMD has been a matter of serious attraction for the researchers from last few decades.

Barasa (2014) observed a weak positive relationship between the selected macro-economic variables (inflation, money supply, and GDP per capita) together and the stock market performance of Kenya. The study also found an inverse but insignificant relationship between inflation and stock market performance, and that the Money Supply and Gross Domestic Product (GDP) per capita had a positive yet weak and insignificant relationship with the Kenyan stock market performance. Mukherjee and Naka (1995) applied Johansen's (1991) vector error correction model (VECM) to investigate whether cointegration exists between the Tokyo Stock Exchange index and six Japanese macroeconomic variables, precisely the exchange rate, money supply, inflation, industrial production, long-term government bond rate, and call money rate. They found that the signs of the long-term elasticity coefficients of the macroeconomic variables on stock prices are generally consistent with the hypothesized equilibrium relations. Further, the VECM exhibited superior forecasting ability to the vector autoregressive (VAR) model.

Karthik & Kannan (2011) investigated the effect of FDI and other major contributing factors on the SMD of India. The results supported the complementary role of FDI in

the SMD of India. Other macroeconomic variables affecting SMD were found to be domestic savings, Gross National Product (GNP) per capita, and inflation. In the research paper of Ali (2014), a number of variables were studied to find out the relationship between FDI and the stock market. The regression model included market capitalization, FDI, GNP and inflation rate as independent variables impacting the FDI and stock market. Results showed positive influence of FDI over the stock market. GNP also showed a positive sign which implied that economic growth is necessary for the SMD. Both the studies of Sultana & Pardhasaradhi (2012) and Dhiman & Sharma (2013) found that the flow of FDI in India was moving in tandem with Sensex and Nifty determining the trend of the stock market of India. In case of Ghana too, Adam & Tweneboah (2008) found that increase in FDI significantly influenced the development of stock market there.

Do and Levchenko (2004) pointed out in their study that, to the extent a country's financial development is endogenous, it would accordingly be influenced by trade. They conducted their study applying data on financial development for a sample of 77 countries only to find that, in richer countries Trade Openness (TO) promotes financial system growth, whereas in under-developed nations, TO thwarts the pace of Financial Market Development (FMD). The study of Kakar and Khilji (2011) also examined the causality between FDI, TO and economic growth for Pakistan and Malaysia for the period of 1980 to 2010. Results established that TO positively affect the economic growth in both Pakistan and Malaysia in the long run. Calderona and Kubota (2008) used annual data on FMD, financial openness and other control variables for a sample of 145 countries for the period of 1974 to 2007. Their opinion was also in the same line stating that, rising financial openness expands private credit, bank assets, SMD and private bond market development, and generates efficiency gains in the banking system, provided, the level of institutional quality, the extent of investor protection and the degree of TO ranges from moderate to high level. Matadeen and Seetanah (2013) acknowledged that, financial openness and TO are two important channels through which financial development is promoted. Therefore, in their paper they attempted to thoroughly scrutinize the linkages among financial development, financial openness and TO in Mauritius for the period 1989-2011. The findings indicated that in the long-run financial openness was conducive to financial development, but astonishingly the impact of TO was negatively significant on financial development. Similar investigation by Alajekwu, Ezeabasili and Nzotta (2013) on the impact of TO on SMD

and economic growth of Nigeria concluded that, openness to external economies had no significance contribution to the development of Nigerian stock market in specific and the economy in general. Al-Abedallat and Al Shabib (2012) in their attempt to track the impact of the changes in investment and GDP on the Amman Stock Exchange Index of Jordan, for the period of 1990 to 2009 found that there exist relationship between the investment, GDP and the Amman Stock Exchange index, and between each of them separately and the stock index. McGowan (2008) in his paper found out a statistically significant positive relationship between gross national income per capita (GNI) and total stock market capitalization to gross national income for the period of 1994 to 2003. He substantiated that developed economies have developed stock markets that reflect the ability of entrepreneurs to raise huge sums of money and reflect the markets' ability to direct funds to successful entrepreneurs. According to him, low income economies did not have efficient stock markets that can provide sources of funds to entrepreneurs or perform the function of capital allocation effectively.

Ali, Rehman and Nasir (2016) examined the relationship among stock market capitalization, capital formation and economic growth in Saudi Arabia. The study could not establish any long term relationship among the variables. However, it was observed that capital formation caused economic growth and stock market capitalization caused capital formation. The study of Bist (2017) concerning the empirical relationship between SMD and economic growth in Nepal from 1993 to 2014 revealed that economic growth, market capitalization, gross capital formation and inflation shared a stable long-run relationship in Nepal.

Benigno investigated the linkage between changes in 10-year government bond yields and stock returns for fourteen developed countries over the period 1999-2015 using the QQ (quantile-on-quantile) approach. It was observed that the relationship between 10-year sovereign bond yield fluctuations and stock returns was heterogeneous across the selected countries, presumably due to the divergences in the degree of indebtedness among countries, the level of interest rates in each country, the relative weight of most interest rate sensitive sectors in the stock market of each country and the level of development of financial derivative markets. Moreover, the interest rate-equity market link also varied considerably across quantum of interest rate changes and stock returns. However, Hamdan (2014) found a negative impact of interest rate on the efficiency of stock market.

Contextually, the present study aims towards identifying whether there is any causal relationship between selected macroeconomic variables and SMD in India or not.

2. Objectives of the Study

The study aims to focus on the following aspects:

(i) To analyse the brief statistical properties of the selected macroeconomic variables.

(ii) To analyse the long-run integration and short-run causal relationships between the selected macroeconomic variables and variable for stock market development of India.

(iii) To study the dynamic interacting relationships among the selected variables in the stock market development of India and to make necessary conclusions.

3. Data Description and Research Methodology

3.1. Data Source and Time Frame: The secondary data has been extracted from the World Development Indicators (WDI) of the World Bank. The study is based on the annual data for the period from 1988 to 2016, consisting of 29 observations. The absolute figures from the database have been collected in current US$.

3.2. Selection and Description of Variables: The macro economic variables have been selected after reviewing various relevant literatures and on the basis of availability of comparable data. The selected variables are FDI (Adam & Tweneboah, 2008; Kakar & Khilji, 2011; Karthik & Kannan, 2011; Sultana & Pardhasaradhi, 2012; Dhiman & Sharma 2013; Kinuthia & Murshed, 2015), Gross National Income (GNI) (McGowan, 2008; Karthik & Kannan, 2011; Kinuthia & Murshed, 2015), Gross Capital Formation (GCF) (Ali, Rehman, & Nasir 2016; Bist 2017), Trade Openness (TO) (Do & Levchenko, 2004; Calderona and Kubota 2008; Kakar & Khilji, 2011; Matadeen & Seetanah 2013; Alajekwu, Ezeabasili & Nzotta 2013; Kinuthia & Murshed, 2015) and Real Interest Rate (RIR) ((Benigno; Hamdan 2014).

Stock Market Development (SMD) has been measured taking log of market capitalization of listed companies (LMCAP) as the dependent variable. Market capitalization (also known as market value) is the share price times the number of shares outstanding, and listed domestic companies signify the domestically incorporated companies (excluding investment companies, mutual funds, or other collective investment vehicles) listed on the country's stock exchanges at the end of the year.

The independent variables considered are:

(a) Log of net FDI inflows (LFDI) [It is the net inflows of investment to acquire a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital].

(b) Log of gross national income (LGNI). GNI (formerly Gross National Product) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad.

(c) Log of gross capital formation (LGCF). GCF (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.

(d) Real interest rate (RIR). It is the lending interest rate adjusted for inflation as measured by the Gross Domestic Product (GDP) deflator (World Bank 2018), and

(e) Trade openness (TO), measured as the difference between export and import of goods and services adjusted against GDP.

3.3. Econometrics Models Used: Johansen Cointegration Test (JCT), Vector Error Correction Model (VECM) and Impulse Response Function Test (IRF) have been applied to the time-series to investigate the causal long-run and dynamic short-run associations among the selected variables. But before conducting such study, the descriptive statistics, Pearson's Correlation Co-efficient of the selected dependent and independent variables, and the Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) Unit Root tests were conducted to learn about the existence of unit roots in the data series.

4. Analysis and Discussion

4.1. Summary Statistics

Table 1: Summary Statistics

	LMCAP	LFDI	LGCF	LGNI	RIR	TO
Mean	26.27291	22.10871	25.98106	27.21069	5.994426	32.7968
Std. Dev.	1.359297	1.95531	0.9187	0.712149	2.440637	14.44387
Skewness	-0.02732	-0.514849	0.310398	0.365457	-0.74796	0.291968
Kurtosis	1.748325	2.214265	1.460269	1.629874	3.226209	1.555942

Jarque-Bera (Probability)	1.831289 (0.400259)	1.957264 (0.375825)	3.21552 (0.200336)	2.813395 (0.244951)	2.670438 (0.263101)	2.830664 (0.242845)

The summary statistics of the selected dependent and independent variables, as shown in Table 1, exhibits that, during the sample period under study i.e. 1988–2015, the highest mean was observed in case of TO followed by LGNI, LMCAP. Standard deviation (SD), which is a measure of risk, is the highest in case of TO. Skewness and kurtosis measures provide insights about the underlying statistical distribution of the data. It is evident that skewness is negative in cases of LFDI and RIR. However the skewness of dependent variable LMCAP is significantly different from all other independent variables. The values of skewness and kurtosis suggest that the variables are not normally distributed. Except RIR, none of the variables having Kurtosis value nearest to 3 (which is required for normal distribution). Since the variables are different macroeconomic indicators and so simple summary statistics based on central tendency values like mean, skewness etc. are not sufficient and comparable for this purpose. To test whether the variables are normally distributed, Jarque-Bera statistics are also calculated and analysed. The Jarque-Bera test however indicates the acceptance of normality on these six variables.

4.2. Pearson's Simple Correlation Coefficients

Table 2: Pearson's Pair-Wise Simple Correlation

	LMCAP	**LFDI**	**LGCF**	**LGNI**	**RIR**	**TO**
LMCAP	1.000000					
LFDI	0.934566 (0.0000)*	1.000000				
LGCF	0.953858 (0.0000)*	0.908296 (0.0000)*	1.000000			
LGNI	0.948755 (0.0000)*	0.912773 (0.0000)*	0.994304 (0.0000)*	1.000000		
RIR	-0.337387 (0.0791)***	-0.250844 (0.1979)	-0.388858 (0.0408)**	-0.368049 (0.0540)***	1.000000	
TO	0.944965 (0.0000)*	0.912964 (0.0000)*	0.972677 (0.0000)*	0.961037 (0.0000)*	-0.461891 (0.0133)**	1.000000

Figures in ( ) are respective *p* values. * , ** and *** indicate null hypothesis of no correlation is significant at 1%, 5% and 10% levels of significance respectively.

From Table 2 it can be observed that correlation coefficients between LMCAP and the select macroeconomic variables are found to be positive and strong in most of the cases except the case of RIR, which reflects the inverse relationship of RIR with LMCAP. The highest positive correlation coefficient is found between LGCF and LGNI which is 0.994304. All the correlation coefficients are significant at their respective level of significance. However correlations show the association among selected variables, but can't show the long-run and short-run co-movement and linkages among them. The correlations need to be further verified by means of other tests shown subsequently.

4.3. Unit Root Tests

Two or more non-stationary time series are said to be cointegrated if a linear combination of the variables is found stationary. In analysis of cointegration, test of non-stationarity of the time series data is considered as the precondition. The other condition is that all series should be integrated in the same order i.e. I (d), where d is the order of integration. For stationarity analysis, Augmented Dicky-Fuller (ADF) and Philip-Perron (PP) tests have been conducted.

However, the result of the ADF test is highly dependent on the lag selection. Akaike Information Criteria (AIC) is considered for selection of lag length (*k*). In this respect the automatic criteria has been considered. In addition to ADF Test, Philip Perron (PP) unit root test is also used as an alternative nonparametric model.

Table 3: Unit Root Test

	At Levels		**At First Differences**	
	ADF	**PP**	**ADF**	**PP**
	Intercept + Trend	**Intercept + Trend**	**Intercept +Trend**	**Intercept +Trend**
LMCAP	-2.694142 [0] (0.2464)	-2.694142 [0] (0.2464)	-6.459773 [0] (0.0001)*	-6.594756 [2] (0.0001)*
LFDI	-1.842537 [2] (0.6534)	-2.384157 [0] (0.3788)	-5.346487 [0] (0.0010)*	-5.343260 [1] (0.0011)*

LGCF	-2.184325 [0] (0.4787)	-2.194732 [2] (0.4734)	-5.588627 [0] (0.0006)*	-5.567970 [2] (0.0006)*
LGNI	-2.491465 [0] (0.3293)	-2.494165 [1] (0.3281)	-4.768719 [0] (0.0040)*	-4.771321 [1] (0.0039)*
RIR	-2.383901 [2] (0.3781)	-3.338558 [2] (0.0815)	-7.449858 [0] (0.0000)*	-7.449400 [1] (0.0000)*
TO	-0.823749 [0] (0.9506)	-1.192830 [2] (0.8919)	-4.128615 [0] (0.0165)*	-4.119266 [1] (0.0168)*

Figures in [ ] represent Lag Lengths based on AIC in case of ADF Test and Bandwidth based on Newey-West,

* Indicates the statistical significance level of 1%; Figures ( ) represent MacKinnon (1996) one sided *p* values.

Table 3 suggests that the null hypothesis of existence of a unit root cannot be rejected in respect of all the variables at levels at 5% level of significance and hence all variables are non-stationary in both models, with linear trend including both intercept and time trend. However, they are all stationary in first difference forms as the test statistics in both ADF and PP tests are significant at 1% level. Therefore, all the variables are found to be integrated of order one as they are stationary at their first difference, i.e., all the variables are I (1).

4.4. Long-run Integrating Relationships: Johansen's Cointegration Test

The next step is to apply the Vector Autoregressive (VAR) approach of Johansen (1988) and Johansen & Juselius (1990) test, where cointegration or linkages among the selected variables is tested. Cointegration analysis serves the purpose to determine whether a long-run equilibrium relationship exists between a group of non-stationary variables. In case of presence of a long-run equilibrium relationship among the study variables, they are said to be cointegrated in the long-run. Cointegration also presupposes causality in at least one direction and this may be determined employing Vector Error Correction Model (VECM). Since all the study variables are integrated of same order (i.e. order 1) Johansen model can be applied.

Table 4: Johansen's Multivariate Cointegration Test Results (With Lag 1)

Multivariate Cointegration among LMCAP, LFDI, LGCF, LGNI, RIR and TO							
Hypothesized No. of CE (s)	**Eigenvalue**	**Trace Statistics**	**Critical Value**	**Prob.**	**Max-Eigen Statistic**	**Critical Value**	**Prob.**
None, r = 0	0.860382	163.2707	117.7082	**0.0000***	51.19004	44.49720	**0.0081***
At most 1, r ≤ 1	0.802304	112.0807	88.80380	**0.0004***	42.14669	38.33101	**0.0174***
At most 2, r ≤ 2	0.701926	69.93399	63.87610	**0.0142***	31.47077	32.11832	0.0598
At most 3, r ≤ 3	0.533007	38.46322	42.91525	0.1300	19.79748	25.82321	0.2549
At most 4, r ≤ 4	0.366163	18.66574	25.87211	0.3010	11.85507	19.38704	0.4287
At most 5, r ≤ 5	0.230450	6.810668	12.51798	0.3647	6.810668	12.51798	0.3647

Trace Test indicates 3 cointegrating equ (s), whereas Max-Eigen value Test indicates 2 cointegrating equ at the 0.05 level. *Indicates rejection of null hypothesis of no cointegration at 0.05 level; *p*-values are MacKinnon- Haug-Michelis (1999) *p*- values. The first four variables are at logarithmic levels. RIR and TO are at only levels. Test considers linear deterministic trend (restricted)

Table 4 values show the results of Johansen's Multivariate Cointegration test among the study variables. Before conducting the test, an unrestricted level VAR has been run on the variables to find out the appropriate lag length. Finally lag length 1 is selected which qualifies the residuals diagnostic tests relating to autocorrelation and heteroskedasticity.

From the Table it is observed that, the Trace Statistics show existence of three cointegrating equations at 5% level of significance among the research variables, whereas the Max-Eigen Value Statistics show that there exist two cointegrating equations among the variables at 5% level of significance. Hence overall there exist at least two cointegrating relations among the variables jointly. This implies that all the selected variables have long-run associations. In other words, stock market development and the selected macroeconomic variables move together in long-run. In

the presence of long-run linkages among the variables it is also imperative to test the short-run shock.

Table 5: Johansen's Pairwise Cointegration Test Results (With Lag 1)

Hypothesized No. of CE (s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.	Max-Eigen Statistic	0.05 Critical Value	Prob.
LMCAP- LFDI							
None, r = 0	0.332741	17.14661	25.87211	0.4041	10.51901	19.38704	0.5635
At most 1, r ≤ 1	0.225012	6.627600	12.51798	0.3850	6.627600	12.51798	0.3850
LMCAP- LGCF							
None, r = 0	0.431125	17.61892	25.87211	0.3701	14.66644	19.38704	0.2124
At most 1, r ≤ 1	0.107347	2.952485	12.51798	0.8822	2.952485	12.51798	0.8822
LMCAP- LGNI							
None, r = 0	0.472970	20.23013	25.87211	0.2145	16.65292	19.38704	0.1195
At most 1, r ≤ 1	0.128540	3.577210	12.51798	0.8020	3.577210	12.51798	0.8020
LMCAP- RIR							
None, r = 0	0.248642	12.83020	25.87211	0.7513	7.432716	19.38704	0.8691
At most 1, r ≤ 1	0.187464	5.397487	12.51798	0.5403	5.397487	12.51798	0.5403
LMCAP- TO							
None, r = 0	0.344336	13.62937	25.87211	0.6880	10.97477	19.38704	0.5159
At most 1, r ≤ 1	0.097061	2.654599	12.51798	0.9148	2.654599	12.51798	0.9148

Trace Test and Max-Eigen value Test indicate no cointegrating equ at the 0.05 level. *Indicates rejection of null hypothesis of no cointegration at 0.05 level; *p*-values are

MacKinnon- Haug-Michelis (1999) *p*- values. All the variables are at level. Test considers linear deterministic trend (restricted)

In addition to Johansen's Multivariate Cointegration test, an attempt has been made to test whether the dependent variable LMCAP has pairwise long-run association with the other independent variables individually. The Table 5 values show that there is no long-run association between LMCAP and other independent variables when they are considered individually. Hence, it can be said that there is no pairwise cointegration between LMCAP and other independent variables in long-run. However from multivariate cointegration it is observed that there is a long-run integration between LMCAP and other independent variables.

4.5. Long-run and Short-run Dynamic Causal Relationships: Granger Causality/ Block Exogeneity Test

When Johansen's Cointegration test shows the long-run relationship among all the variables, there always exists a corresponding error correction representation. The error correction term (ECT) is also known as the speed of adjustment. The speed of adjustment shows the power of a variable in convergence to the long-run integrating relationship. If the coefficient of the ECT is negative and significant, then it is considered that there exists long-run causality running from all the macroeconomic variables to LMCAP (dependent variable). Table 6 shows that ECT $_{t-1}$ (equation normalized on LMCAP) is significant at 5% level of significance (probability 0.0386) and the coefficient of ECT is negative i.e., -0.601173. It implies that LMCAP acts as the restoring agent of long-run equilibrium relationship. In other words, in case of divergence from the long-run equilibrium relationship, LMCAP will act as the restoring agent to form the long-run equilibrium with 60.12% speed of adjustment, which is quite high.

In existence of long-run relationship, short-run dynamic association among the test variables is tested using Block Exogeneity Wald test based on Vector Error Correction Model (VECM). The Chi Square statistic values show that none of the independent variable is pairwise significant with the dependent variable LMCAP as the null hypothesis of the no Granger Causality cannot be rejected. Therefore, it is observed that in the short-run, none of the independent macroeconomic variable can influence the dependent variable LMCAP. However, all the independent macroeconomic variables jointly influence LMCAP in short-run, as the Chi Square statistic is jointly significant

at 10% level (probability 0.0848). The model tested in Table 6 also satisfies the statistical diagnostics test.

Table 6: VECM Based Block Exogeneity Wald Test Results (With Lag 1)

Independent Variables → χ^2 **Statistics (Probability)**						***T* -statistics**
Dependent Variables ↓	**ΔLFDI**	**ΔLGCF**	**ΔLGNI**	**ΔRIR**	**ΔTO**	ECT_{t-1}
ΔLMCAP	2.655655 (0.1032)	1.711783 (0.1908)	0.481222 (0.4879)	0.353722 (0.5520)	-1.216612 (0.2700)	-0.601173 [-2.231045]** (0.0386)

Note:

ECT_{t-1} is derived by normalising the cointegrating vectors on the LMCAP. The figures in brackets are the respective *p* values of the χ^2 statistics and figure in [ ] is the *t* statistic of the ECT_{t-1}.

* represents significant at 5% level.

4.6. Impulse Response Function (IRF) Test

The economic significance of stock market development is difficult to evaluate. Here not only a single variable like FDI or the single coefficients matter, but also the persistence of shocks matters a lot. VECM by itself is of no use as it lacks the explanation of the behaviour of the variables when a small change takes place in any cointegrated variable. For this purpose, IRF test has been used to identify the effect of one standard deviation (S.D.) shock or innovations in one variable to itself or other variables. This study considers a response period of 5 years. From the Table 7 it is evident that LMCAP is influenced more by its own shock. In the first year, response of LMCAP for one S.D. shock to it is 0.3561 and in the fifth year it is 0.3154. But LMCAP is more influenced by both TO and FDI, because even after one year they continue to impact the LMCAP to a higher degree. FDI is also getting impacted by its one shock. In the first year of response, it is 0.4464 and after that it started to lose its power. However amongst the variables, FDI is more influenced by LMCAP in the third year i.e. 0.3149. LGCF is more influenced by the shock in LFDI. For one S.D. innovations to LFDI, the response of LGCF is the highest 0.1563 in the fifth year.

LGNI shares the highest impact for one unit shocks to LFDI. The response of LGNI to a shock in LFDI is 0.1032 and 0.1098 in the third and fifth years respectively. RIR responses more by its own shocks i.e., 2.4366 in the first year. TO is more influenced by its own shocks than shocks from other variables.

From the above analysis it is crystal clear that FDI and TO have huge impacts on stock market development of India, which implies that as the market is developed, it attracts FDI flow in the markets. On the other hand, TO also has strong impact on the Indian stock market development. As the economy is opened up to the rest of the world, it creates a momentum to steer the development of stock market and this view also follows the literatures.

Table 7: Impulse Response To Choleski (D.F. Adjusted) One S.D. Innovations

Responses by Variables ↓	Response Period (Year)	LMCAP	LFDI	LGCF	LGNI	RIR	TO
LMCAP	1	0.356140	0.000000	0.000000	0.000000	0.000000	0.000000
	2	0.276539	0.026765	-0.080385	-0.147578	-0.177134	0.022224
	3	0.267693	0.036216	-0.006915	-0.170305	-0.093892	0.055763
	4	0.306626	0.008669	-0.003281	-0.143026	-0.152582	0.057899
	5	0.315366	0.063606	-0.003660	-0.167578	-0.189565	0.043168
LFDI	1	-0.005671	0.446386	0.000000	0.000000	0.000000	0.000000
	2	0.183592	0.307987	-0.114950	0.014089	0.178648	0.104925
	3	0.314909	0.240558	-0.165367	-0.098097	0.143286	0.133466
	4	0.284043	0.216800	-0.170358	-0.167945	0.120640	0.164020
	5	0.308253	0.205270	-0.141741	-0.164414	0.130995	0.174750
LGCF	1	0.077305	0.089836	0.097578	0.000000	0.000000	0.000000
	2	0.080708	0.103268	0.069458	-0.003662	-0.094607	0.005791
	3	0.088855	0.151392	0.089193	-0.034193	-0.096299	0.005645
	4	0.069950	0.140739	0.093829	-0.035626	-0.115463	0.017474
	5	0.092875	0.156342	0.105654	-0.032918	-0.119523	0.012814
LGNI	1	0.027995	0.059730	0.034370	0.029819	0.000000	0.000000
	2	0.033359	0.081765	0.027291	0.019054	-0.051190	-0.001330

	3	0.025578	0.103210	0.037193	0.004427	-0.056534	0.001661
	4	0.024146	0.101257	0.043876	0.006916	-0.062876	0.005990
	5	0.032328	0.109825	0.046829	0.006774	-0.071778	0.003372
RIR	1	0.495214	0.743649	-0.337853	0.113463	2.436589	0.000000
	2	-0.378816	-0.349878	-0.432493	-0.158614	1.978230	0.312417
	3	0.279121	-0.140053	-0.081313	0.149993	2.405220	0.134190
	4	-0.050510	-0.163068	-0.375769	0.075878	1.899764	0.101698
	5	-0.035189	-0.023508	-0.222811	0.058710	2.250744	0.100949
TO	1	-0.459807	0.632268	0.286612	-1.539655	-1.109377	1.529091
	2	1.521690	1.011476	1.204196	-1.975398	-1.888516	1.917441
	3	1.422739	1.811911	1.160251	-2.828251	-3.986610	1.977417
	4	1.150627	2.591009	1.736258	-3.221584	-4.239925	2.117227
	5	1.197484	2.700038	1.994525	-3.103380	-4.708483	2.198071

Note: Choleski Ordering LMCAP LFDI LGCFLGNI RIR TO and built on 6-dimensional VEC Model (1 lag)

5. Conclusion

The current study attempts to empirically examine the relationship between macroeconomic variables and the development of stock market of India. In this context, it has tried to find out the causal long-run and dynamic short-run linkages amongst SMD (LMCAP) and other factors (independent variables here) considered being responsible for such development. The results of the study support the view of many experts regarding the positive impact of FDI on the SMD (Adam & Tweneboah, 2008; Soumare & Tchana, 2011; Raza, Iqbal, Ahmed, Ahmed & Ahmed, 2012). However the results also assert that FDI is not only the driving force behind such enormous development of stock market since 2000. In addition to FDI, lot of other factors namely, RIR and TO have also significantly impacted the Indian SMD. So the claim of many economists and researchers that FDI can accelerate the speed of Indian stock market development (Sultana & Pardhasaradhi, 2012; Dhiman & Sharma, 2013) is not at all fully viable unless many other factors are considered. It is obvious that FDI has always influenced such development, but such influence has meagre impetus considering the overall development that took place after year 2000.

Johansen's Test upholds that not only a single macroeconomic variable, but also all other selected variables have strongly impacted Indian stock market development. But individually they are unable to drive the development force in the Indian stock market as none of them is pairwise cointegrated in the long-run. VECM also has supported the same view. It shows the long-run causal relationship among SMD and other independent variables. Indian stock market development acts as significant restoring agent to form long-run relationship. It implies that developed Indian stock market is an attractive force for other variables. Granger Causality test suggests that macroeconomic variables have failed to create any impression on Indian stock market development in short-run as the individual force of each variable is not so significant so that they can create a heavy impact in the short-run. But their joint force has influenced development of Indian stock market. However, such individual small impacts have agglomerated in heavy force in the long-run which altogether has driven the Indian SMD process.

IRF test has pinpointed the factors which are influencing the SMD the most. It shows that, although FDI is important for Indian stock market development, but it is influenced more by the TO than by FDI. In contrary, it is also evident that FDI inflow is generally more in developed and emerging markets than that of underdeveloped markets. As the market starts developing, it creates an attractive force which positively attracts FDI in that market just like a magnet attracts a piece of iron. Therefore SMD development is influenced by many factors in addition to FDI flows. Therefore, in a nutshell, it can be concluded that many factors are jointly responsible for the development of Indian stock market. Neither foreign direct investment nor trade openness acts as the panacea for the development of stock market of India. Rather many other macroeconomic factors play vital role in the development process of Indian stock market.

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