

Growth-finance nexus: Empirical evidence from India

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Abstract. *The relationship between financial development and economic growth has attracted considerable attention of policymakers and researchers alike. The present study aims to empirically examine the relationship between economic growth and financial development in the post-reform period, from 1992-1993 to 2014-2015. The period witnessed reforms towards financial liberalisation like deregulation of interest rates, lowering reserve requirements, removal of financial markets imperfections and the development of an efficient and sound financial sector. The indicators of financial development used in the study are Broad money to GDP ratio, Stock market capitalization to GDP ratio and Traded Value ratio. The study employs Johnson co-integration technique and finds long run relationship among the variables. Multivariate Granger causality test finds market capitalization and traded value ratio together granger cause GDP, and market capitalization and broad money together granger cause GDP. Also, the study finds causality running from GDP and traded value ratio to market capitalization. The results, therefore, indicate considerable interdependence among economic growth and financial development in the post reform period under study.*

Keywords: financial development, economic growth, Granger, co-integration.

JEL Classification: C22, G12, G2, O4.

Introduction

Increasing the pace of economic growth has been the focus of economists and policymakers for decades. Well-developed financial systems support the growth process through savings and investments by helping households and firms to grow, trade and raise investments by mobilizing savings, ensuring that these funds are allocated to the most productive use, providing liquidity and spreading risk so that firms operate efficiently. Hence, financial development through the various initiatives towards deregulation and liberalization is an important step towards unleashing and sustaining growth for an economy. Financial sector reforms primarily entail reforms of the banking system and the capital market. With deregulation of the interest rate, Indian banking system has become broad and more market oriented since 1991. In this light, it becomes important to understand the growth-finance relationship for the Indian economy since the time of adoption of the new economic policy of liberalization. The present study is, therefore, an attempt to understand the growth-finance relationship in the Indian case in the post reform era, during 1992-2014.

Jorgenson (1995) posits that physical capital accumulation does not, per se, account for much of long-run economic growth. Therefore, if finance is to explain economic growth, efforts are needed to identify how financial development possibly influences resource allocation decisions in ways that foster productivity growth and not aim the analytically spotlight too narrowly on aggregate savings (Levine, 2004). Bagehot (1873) observed the important role played by financial development in the industrialisation process in England. His claim was that capital mobilisation is necessary for enhanced industrialisation was facilitated by financial development. In simplest sense, financial development can be seen as a process of improving quantity, quality and efficiency of financial intermediary services. One of the earliest seminal studies on growth finance nexus by Schumpeter (1911), Shaw (1973) and McKinnon (1973) highlighted the productivity and growth enhancing effects of financial sector development. The existing body of literature has identified many transmission channels by which financial development can impact economic growth via their effects on savings-investment behavior. According to Levine (2004), financial development involves improvements in the (i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings (v) exchange of goods and services. Each of these financial functions may influence savings and investment decisions and hence economic growth.

In his seminal study, Patrick (1966) argues the growth-finance relationship to be two-fold: on the one hand, demand for financial services is taken as function of output growth and upon a transition to modernity, and on the other hand, it is the availability of financial services that stimulates demand and thereby growth. The former is termed as the demand-following hypothesis which implies causation to move from growth to finance, while the latter is the supply-leading hypothesis which reinforces endogenous growth argument, that financial development precedes economic growth. India is a developing country that has adopted several policies in order to strengthen and deepen its financial sector since

the liberalization period, hence it is against this background that this paper seeks to examine the impact of financial deepening on economic growth in India from 1992 to 2014, using annual data on liquid liabilities, stock market capitalization and traded value ratio as proxies for financial deepening.

Review of literature

The economic growth and development of a country depend heavily on the deepening of its financial system. The claim has been argued by authors such as Gurley and Shaw (1955) and Goldsmith (1969) stressing the role of financial intermediation in the saving-investment process, where money, whether narrowly or broadly defined, forms an integral part of a wide spectrum of financial assets wealth-holders' portfolio. However, not all are convinced regarding the pertinence of finance to economic growth. As early as Robinson (1952) represented many when she wrote 'where enterprise lead finance follows' and Lucas (1988) expressed his concern about financial sector being 'badly over-stressed' by economists in its role in economic growth. The relationship between growth and finance has been empirically studied and tested by various researchers, in developed as well as developing countries. The reviewed literature can be broadly categorized, theoretically as well as econometrically, in two groups: country specific time series studies and panel studies.

Halicioğlu (2007) investigated the validity of the demand-pulling and the supply-leading hypotheses for Turkey using annual data from 1968 to 2005. The study uses ratio of broad money stock to nominal national income and the ratio of bank deposit liabilities to nominal national income as proxies for financial development and real per capita income to be the relevant variable for economic growth. Using bounds testing approach to test the long run and short run relationship between economic growth and financial development, the study finds unidirectional causation from financial development to economic growth.

A study by Bakang (2015) for the time period 2000 to 2013 analyzed the effects of financial deepening on economic growth in the Kenyan banking sector. Financial deepening was captured by four alternative indicators: Liquid Liabilities as ratio to nominal GDP, Credit to the Private Sector as ratio to nominal GDP, ratio of Commercial Bank Assets to commercial bank assets plus Central Bank Assets, and Commercial Bank Deposits as ratio to nominal GDP. The dependent variable, economic growth, was measured by real GDP. The study found that banking sector in Kenya has an important role in the process of economic growth.

Hsu et al. (2004) came up with interesting results in their study on the role of financial development in Taiwan, Korea and Japan using the Generalized Method of Moments (GMM) and Principal Components Analysis. The study established finance had negative effects in Taiwan and Korea but was vital in propelling growth in Japan. Further, the study showed that unlike in Korea and Japan, stock market development had positive effects on the economic growth of Taiwan.

A dynamic panel study for ten new European Union countries was performed by Sova (2009) to study the main features of the banking and financial sector in ten new EU members, and examine the discussed relationship over the period 1994-2007. The study estimated an augmented Barro-growth regression with financial development represented by ratio of liquid liabilities to GDP, private sector credit to GDP, household credit to GDP and stock market capitalization as a percentage of GDP. It found that the credit and stock markets were still underdeveloped in these countries and so, their contribution to economic growth was limited owing to lack of financial depth. Granger causality test indicated causality from financial development to economic growth, but not in the opposite direction.

Rachdi and Mbarek (2011) conducted an analysis based on a sample of 10 countries, 6 from the OECD region and 4 from the Middle East and North African (MENA) region during 1990-2006 using panel data co-integration and system GMM approaches. The GMM results showed strong linkage between economic growth and financial development. The error correction model showed that causality was bi-directional for the OECD countries and unidirectional for the MENA countries, running from growth to financial development.

A similar panel study to examine the relationship across 89 countries in industrial, emerging market economies and other developing countries over the period 1970-2009 was conducted by Pan and Wang (2013). The study indicated that financial development plays a significant role in explaining the variance of output growth in emerging market economies and industrial countries but not in the developing countries. Also, contrastingly, financial development variability is mainly driven by country and idiosyncratic factors.

Some of the studies conducted for India were extensively surveyed. Hussain and Chakraborty (2012) demonstrated for Assam, a state of India, that financial development and economic growth are co-integrated and that financial development Granger-causes economic growth. Deb and Mukherjee (2008) examined the relationship between economic growth and stock market as representative of financial development. The study takes quarterly data on three stock market development proxies, namely, market Capitalization Ratio, stock traded ratio and stock market volatility during 1996 to 2007. The results are from the supply leading hypothesis indicating a strong causal flow from the stock market development to economic growth. A bi-directional causal relationship was also observed between real market capitalization ratio and economic growth. Pradhan (2009), in his study over the period 1993-2008, found a bidirectional causality between money supply and economic growth, bank credit and economic growth and a unidirectional causality from market capitalization to economic growth. A similar study by Bhattacharya and Sivasubramanian (2003) found the causation running from M3, taken as the proxy for financial sector development, to GDP during 1970-1998.

A study for the long period stretching from 1951 to 1995 by Singh (2008), apart from reinforcing the long run relationship between economic growth and financial development, emphasized on 1991 globalization reforms which helped the financial sector to supplement the efforts aimed at achieving high economic growth in India. For

estimating the long run equilibrium models and short run dynamic models, the author employed financial interrelations ratio and new issue ratio (ratio of primary securities issued by nonfinancial institutions to net domestic capital formation) as the measures of financial development.

An analysis specifically focusing the post reform period was done by Chakraborty (2010). The results were in contrast to the above mentioned studies, asserting that stock market turnover had no significant effect, whereas an increase in market capitalization was associated with dampening economic growth and an increase in the money market rate of interest has a positive effect on economic growth during 1993-2005.

The present study is an attempt to investigate the growth-finance nexus in India for 1992-2014 from a broad based perspective encompassing the two main avenues of raising finance which includes both banking and stock market as financial development proxies. In the case of India, the studies have mostly focused either on banking or stock market as representative of financial development. Theoretically, the relationship between the financial development variables and economic growth can be understood from both ways. Increased financial flow stimulates investment and consumption, thereby fueling economic growth, and also, economic growth stimulates demand for the financial assets. This is in essence the debate on supply leading and demand following theories, which we intend to test in the present study.

Data and methodology

Economic growth is represented by Real Gross Domestic Product (GDP) and financial development is proxied by three variables viz. Broad money to Nominal GDP ratio, stock market capitalisation to Nominal GDP ratio (MCAP) and traded value ratio (TVR), which is defined as value of total shares traded divided by nominal GDP. Annual data series on the variables are obtained from the annual reports of Reserve Bank of India and Securities and Exchange Board of India. In line with previous studies and on theoretical considerations, the ratio of broad money to GDP is taken to represent the depth of the financial market relative to the overall economy. Increase in this ratio indicates further expansion in the financial sector relative to the rest of the economy. The market value of shares of listed companies outstanding at a particular point divided by GDP represents the magnitude of the market. Adopting the approach of Demirguc-Kunt and Levine (1996), Levine and Zervos (1998), the assumption behind considering this measure is that overall market size is positively correlated with the ability to mobilize funds and diversify risk on an economy-wide basis. The two popular ratios found in the literature to measure liquidity aspect of the stock exchange are traded value ratio and market turnover ratio. In this paper, we take the Traded Value ratio because of its economy-wide approach in measuring organized trading of firm equity as a share of national output. This is in line with a previous study by Deb and Mukherjee (2008).

It becomes imperative to mention that the study intended to include a variable that reflects the magnitude of financial intermediation by banks. For this purpose, the data on Domestic credit to private sector was taken in the analysis, but it had to be dropped due to

unsettling econometric issues owing to multicollinearity problem. This is reasonable to understand that much of the information captured in this variable gets mirrored in the Broad Money ratio. Hence, the dropping of this variable, though important, would not seriously hamper the results of our analysis.

The standard regression analysis is based on the condition that the variables employed are stationary. For this purpose, the study employs the Augmented Dickey Fuller (ADF) test that examines the presence of unit root among the variables (or non-stationarity) or otherwise. This regression equation is based on the traditional Augmented Dickey Fuller specification:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + T + \sum_{j=1}^m \beta_j \Delta y_{t-j} - k + \varepsilon_t. \quad (1)$$

The null hypothesis of existence of unit root calls for $\beta = 0$. If the null hypothesis of non-stationarity cannot be rejected, the variables are differenced until they become stationary. After this, the study proceeds to test for co-integration to check long run relationship among the variables. The present study employs Johansen test to test for co-integration between the variables in the empirical model because it has an advantage of consideration of the possibility of multiple co-integrating vectors.

The study intends to investigate whether the growth-finance relationship in India during the period under study is demand following and supply leading. For this, we apply Multivariate Granger causality test to find out the direction and causal relationship among the variables. This is a remarkable improvement over other previous which have mostly employed the bivariate framework. This bivariate framework is said to be biased owing to the omission of relevant variable (s) that could affect the relationship between growth and finance. Also, the multivariate Granger causality shows how the other variables individually and jointly Granger causes the dependent variable. The equation below will be employed for Granger causality test.

$$\Delta GDP_t = \alpha_1 + \sum \beta_1 \Delta BM_{t-i} + \sum \theta_1 \Delta M CAP_{t-i} + \sum \delta_1 \Delta TVR_{t-i} + \varepsilon_t \quad (2)$$

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_{1,i} Y_{t-i} + \sum_{i=1}^p \beta_{2,i} X_{t-i} + \varepsilon_{1t} \quad (3)$$

$$X_t = \mu + \sum_{i=1}^p \delta_{1,i} X_{t-i} + \sum_{i=1}^p \theta_{2,i} Y_{t-i} + \varepsilon_{2t} \quad (4)$$

If only β s in equation (3) were significant and θ s are insignificant in equation (4), it means that (X) granger causes (Y), and vice versa. If both β s and θ s were insignificant, it means that (Y) and (X) are independent from each other, if both β s and θ s were significant, it means that a feedback causal relationship exists between (Y) and (X).

The study then employs the Impulse Response Function (IRF) which detects the impact of a onetime shock in one of the innovations on current and future values of the

endogenous variables. It defines the response of the dependent variable in the VAR model to shocks in the error terms.

Empirical findings

A preliminary glance at the variables highlights the fact that financial sector reforms have in fact born fruit to a considerable extent in the post reform period.

Figure 1a. *Financial development proxies*

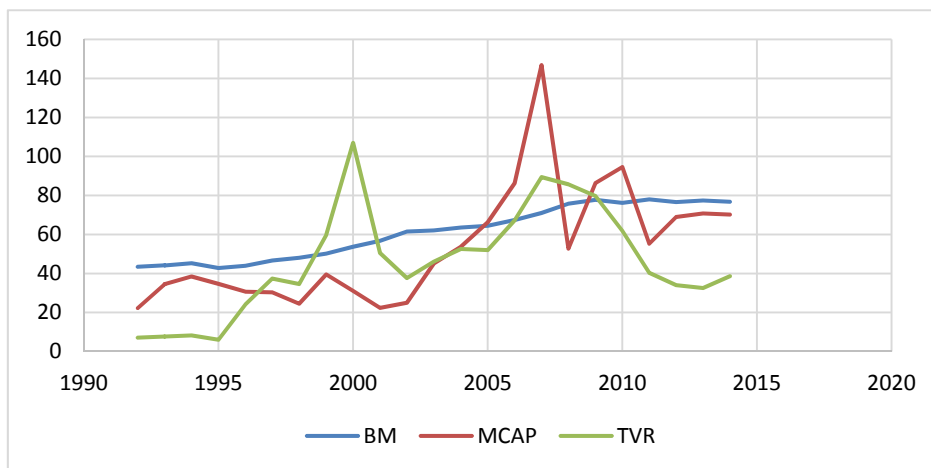
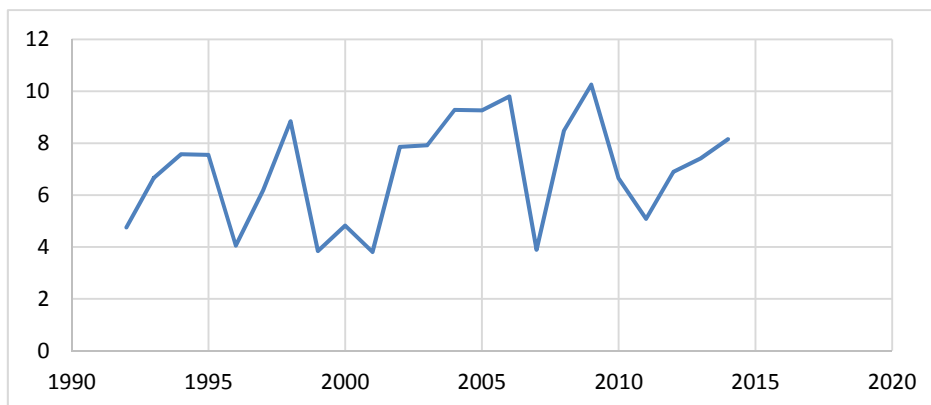


Figure 1b. *Growth rate of real GDP*



Source: Author's compilation.

Figure 1a capture the progress in three financial development variables and Figure 1b shows the corresponding real GDP growth rate over the period. Financial deepening, represented by the ratio of broad money to nominal GDP (BM) has increased by 75% during the period under study. The stock market has seen vibrancy both in terms of size as well as liquidity, with capitalized market value of shares of listed companies as a percentage of GDP (MCAP) standing at 70% in 2015 as compared to being only 22% in 1992. The traded value ratio (TVR), a measure of liquidity of the stock market, touched as high as 106% and close to 85% in some years, whereas it hovered in the range of 5-10%

in the pre-reform period. The period witnessed growth in the real GDP, both in aggregate and per capita.

Stationarity of time series is a pre requisite for performing co-integration analysis. The Augmented Dickey Fuller test for testing the presence of unit root in the time series yielded the following results:

Table 1a. Augmented Dickey-Fuller (ADF) Constant, Linear Trend Unit Root Test at Level

Variables	t statistic	ADF at 1% Level	ADF at 5% Level
GDP	-4.078	-4.440	-3.632
BM	-1.183	-4.440	-3.632
MCAP	-3.378	-4.440	-3.632
TVR	-1.813	-4.440	-3.632

Table 1b. Augmented Dickey-Fuller (ADF) Constant, linear Trend Unit Root Test at First Difference

Variables	t statistic	ADF at 1% Level	ADF at 5% Level
GDP	-5.067	-4.498	-3.658
BM	-6.784	-4.498	-3.658
MCAP	-7.012	-4.467	-3.644
TVR	-4.486	-4.367	-3.644

Note: A variable is stationary when the ADF t-stat is greater than the critical values and Non-stationary when t-stat is less than critical value.

Source: Author's computation.

From the Tables 1a and 1b above, all the variables are non-stationary at level. However, after differencing the series once, all the variables were integrated of order 1 that is I(1). Thus, the null hypothesis of the presence of a unit root is rejected at first difference.

The next step is to examine the existence of a long run association between financial development and economic growth using co-integration analysis.

Table 2a. Johansen co-integration test (For Trace Value stat)

Maximum	Trace Test	5% Critical Value
0	63.108	47.856
1	22.142	29.797
2	8.291	15.494
4	2.091	3.841

Table 2b. Johansen co-integration test (For Max-Eigen Value stat)

Maximum	Max Test	5% Critical Value
0	40.965	27.584
1	13.850	21.131
2	6.2001	14.264
4	2.091	3.841

Source: Author's computation.

The result of the trace and maximum Eigen value summarized in Tables 2a and 2b indicates the possibility of rejecting the null hypothesis of no co-integrating vectors at 5 percent level of significance. The 5 percent critical value is greater than trace statistic meaning a rejection of null hypothesis which and implying the existence of one co-integrating vector. The maximum Eigen value test gives similar result of existence of one co-integrating vector among the variables. This validates the existence of

long run equilibrium relationship between Economic Growth and financial development which means that they do not diverge away from each other in the long run. It means the four variables are co-integrated and have long run association and are moving together in the long run.

The dynamics of economic growth have a strong positive relationship with the stock market and the scale of monetization of the Indian economy. The simultaneity of macroeconomic and financial development indicators (simultaneity bias) can be treated almost as a stylized fact. (Demirguc-Kunt, Levine, 2008). The results are in line with those reached by other studies, reinforcing the claim of the existence of long run relationship between financial development and economic growth. Halicioglu (2007) for Turkey, Ken (2014) for Malawi, Adamopoulos (2010) for Ireland, Rachdi and Mbarek (2011) for select OECD and MENA countries got similar results, among others.

Granger causality

The next crucial analysis in the study is to explore the causal relationship between economic growth and financial development. The Wald Granger Causality Test yields the following results:

Table 3a. *Dependent Variable: D (GDP)*

Excluded	Chi- Square	Df	Prob
D(BM)	16.71	3	0.001
D(MCAP)	4.1269	3	0.248
D(TVR)	15.712	3	0.001
ALL	25.916	3	0.002

Table 3b. *Dependent Variable: D (BM)*

Excluded	Chi- Square	Df	Prob
D(GDP)	3.3971	3	0.334
D(MCAP)	4.0183	3	0.259
D(TVR)	4.8072	3	0.186
ALL	27.829	3	0.001

Table 3c. *Dependent Variable: D (MCAP)*

Excluded	Chi- Square	Df	Prob
D(GDP)	48.179	3	0.000
D(BM)	12.285	3	0.006
D(TVR)	2.1124	3	0.549
ALL	62.008	3	0.000

Table 3d. *Dependent Variable: D (TVR)*

Excluded	Chi- Square	Df	Prob
D(GDP)	16.714	3	0.001
D(BM)	11.158	3	0.011
D(MCAP)	5.0077	3	0.171
ALL	20.784	3	0.014

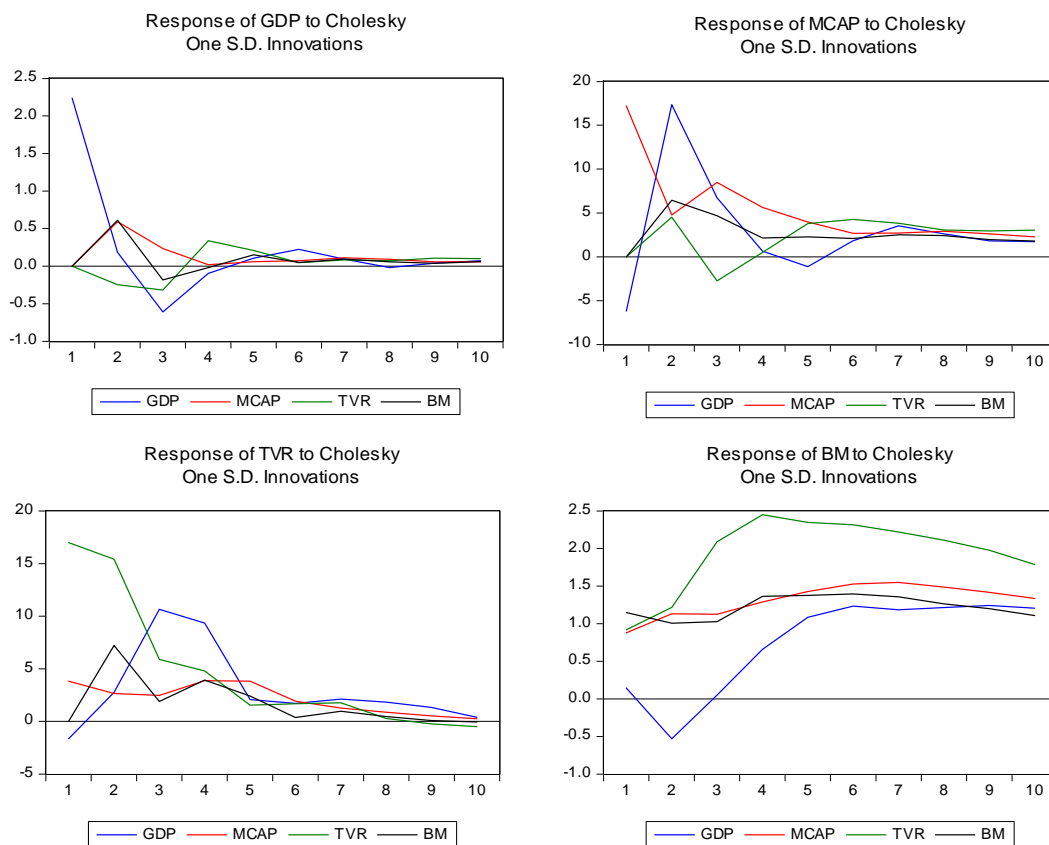
Note: When probability value is more than 10% we do not reject the null hypothesis.

Tables 3a to 3d reveal interesting results. MCAP and TVR together granger cause GDP, and MCAP and BM together granger cause GDP. This supports the earliest argument of finance fuelling economic growth, as given by its earliest proponents like Bagehot (1873) and Schumpeter (1911) among many others. Also, in line with Robinson's (1952) claim

that ‘finance follows enterprise’ the study finds causality running from GDP and TVR to MCAP. Also, there is considerable causal interaction among the financial variables themselves. So, the growth-finance relationship in India in the post reform period displays both supply-leading hypothesis and demand-following hypothesis, correctly being characterized as a ‘nexus’ in the present study. Post- reform period saw improvement both in size as well as allocational efficiency of the Indian financial market. This leads to better credit assessment, punishing the less efficient ones and rewarding the more efficient with enhanced finance. This translates into economic growth. Also, economic growth fuels the demand for enhanced and sophisticated finance. The study finds both these phenomena in India during the period of study.

Impulse Response Function

Figure 2. Impulses between Economic Growth and Financial Development with one standard deviation innovation.



The impulse response function further reinforces the strong interactive relationship between not just economic growth and the three financial development proxies, but also among the three financial development proxies.

Conclusions

This study examined the relationship between economic growth and financial development for the period 1992 to 2014. The study attempts to analyse the presence of any long run relationship between the economic growth and financial development, where financial development is captured by three proxies namely ratio of broad money to GDP, stock market capitalization to GDP and stock turnover ratio. The Johnson co-integration test rejects the null of zero co-integrating vectors and reveals that there exists a long run relationship between the economic growth and financial development. The multivariate Granger causality test confirms the intertwined growth-finance relationship for the Indian economy in the post-reform period. MCAP and TVR together granger cause GDP, and MCAP and BM together granger cause GDP. This indicates supply-leading nature of the relationship. However, the study also finds the causality running from GDP and TVR to MCAP, means the dynamism of economic growth fosters financial development. This implies the demand- following phenomenon. Hence, the relationship is two-way, rightly called a 'nexus'. The reforms in 1991 called for deregulation of commercial banks' lending rates, lowering reserve requirements, better prudential norms and the removal of financial markets imperfections and the development of an efficient and sound financial sector. The study therefore supports the view that financial deepening, as measured by broad money and stock market development, has positive effects on economic growth. The major strand of financial reforms that started in 1991 aimed at reducing the pre-emption of financial resources and channelizing them to productive avenues.

The policy implication of the results of our study is that financial development is to be considered as the policy variable in accelerating economic growth and economic growth could be used as a policy variable to foster financial development in the Indian economy. Hence, the government should maintain the momentum to further develop the financial sector and also to strengthen the long run relationship between financial development and economic growth. In this regard, the financial inclusion policies that broaden the scope of activity of the financial sector need to be broadened and improved further. The measures also call for more financial integration and increasing the status and regulation criteria of financial institutions.

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