

FINANCIAL STRUCTURE GAP AND ECONOMIC DEVELOPMENT IN INDIA

Pradeepta SETHI¹, Brajesh KUMAR²

^{1,2}*National Institute of Financial Management, Sector 48, Pali Road,
Faridabad, Haryana-121001, India*

*E-mails: ¹pradeeptas07@gmail.com (corresponding author);
²bkumar@nifm.ac.in*

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Abstract. This study is built on the concept of optimal financial structure and examines its dynamics with the economic development process of India. Specifically, the present study intends to examine the evolving importance of banks and markets during different stages of economic development. Using annual data from 1988–2009 for India and selected benchmark OECD countries, we have conducted quantile and robust regression to assess the impact of deviation from the optimal financial structure on the output growth. To our knowledge the present study is one of the pioneer works in calculating the optimal financial structure in Indian context. The empirical evidence suggests that as the economy develops the services provided by banks are comparatively more important than those provided by the stock markets. The financial structure matters for the growth process. The deviation from the optimal structure has harmful effects on the economy and the financial structure gap retards the growth process.

Keywords: financial development, financial structure, economic growth, principal component analysis, quantile regression, robust regression.

JEL Classifications: G1, G2, O16.

Introduction

Periodic occurrence of financial crisis has once again brought the finance-growth debate to the forefront of academicians, researchers and policy-makers. Over the decades, developing countries have embraced different methods of economic and financial liberalization in order to achieve higher growth rate (Ahmed, Islam 2009). These measures generally include relaxation of capital control and interest rate barriers, opening up of the financial markets, increasing the availability of credit, integration of equity markets, etc. Though, the measures and outcomes of these reforms have varied across countries, majority of the developing countries have now adopted a more market-based structure. India is no exception to this trend. Adopting this strategy has helped in achieving higher growth rate, but simultaneously it has made the system more prone to systemic instability (Ranciere *et al.* 2008; Bekaert *et al.* 2006). This can be pronounced from the ongoing

financial and economic crisis. Hence, understanding the relative importance of financial structure¹ and its link with economic growth can provide vital policy implications which will help in strengthening and stabilizing the financial system.

Financial economists, for decades, have debated about the relative importance of banks and financial markets in a financial system without arriving at any consensus conclusion. Recently, Lin *et al.* (2009) re-ignited this debate while propounding the ‘Optimal Financial Structure’ theory. According to their theory, the demand for most of the financial services comes from the demands for serving the real economy. An economy at each stage of its development has a specific endowment structure². Similarly depending on the stages of economic development there exists specific industrial structure. The financial system would perform efficiently when the financial structure matches the industrial structure of any economy. In developing economies where capital is scarce in the initial stages of development and unskilled labor is in abundance, the economy grows and survives through the labor intensive industries, e.g. manufacturing of apparel products, sports goods, jewelry, etc. Keeping in synchronization with the industrial structure, the financial structure at this stage of development is predominantly bank-based. As the economy develops, capital becomes available and the industrial focus shifts to capital-intensive industries like heavy motors, engines, etc. where fund requirement is more, thus giving rise to a market-based structure. Hence as the economy develops, the financial structure keeps on changing, but at each stage of development there exists an optimum mixture of banks and markets. If the underlying actual financial structure matches this optimal financial structure the economy performs efficiently.

The present paper has built on this idea of optimal financial structure and examined its association with the economic development process in India. Attempt has been made to calculate the optimal financial structure gap in India and explore its dynamics with economic development. The rest of the paper consists of four sections. Section 1 gives a brief review of the related literature on financial structure and economic development. Section 2 discusses the model specification, data and methodological aspects for the calculation of optimal financial structure and the financial structure gap. Section 3 describes the results and the sensitivities of the results and lastly, we conclude.

1. Financial structure and economic development: a brief literature review

There are *two* very seemingly related but different questions on the issue of finance and development. The *first* question is whether financial development affects real economic activity and the *second* one is whether the structure of the financial system matters for real economic outcomes. Empirical research has explored the first question quite extensively. Following the seminal work by King and Levine (1993), several empirical studies have provided evidence that strongly supports the view that financial develop-

¹ It refers to the mixture of financial markets and intermediaries and their relative importance to the economy.

² Endowment structure refers to various factors of production like labor, capital and natural resources.

ment has a positive effect on various aspects of real economic activity, including investment (Singh, Hamid 1992; Corbett, Jenkinson 1996; Demirgüç-Kunt, Maksimovic 1996; Cobham, Subramaniam 1998; Rajan, Zingales 1998), productivity and long run economic growth (Ang, Mckibbin 2007; Rousseau, Vuthipadadorn 2005; Bell, Rousseau 2001; Levine *et al.* 2000; Beck *et al.* 2000; Luintel, Khan 1999; Levine, Zervos 1998; Levine 1997; Demetriades, Hussein 1996). The evidence suggests that the expansion and deepening of the financial system lead to faster economic growth. Without completely settling the issue of direction of causality (Rousseau, Vuthipadadorn 2005; Demetriades, Hussein 1996; Goldsmith 1969) the empirical literature has made significant advances in establishing that the exogenous component of financial development has a positive effect on economic growth. The results support the view that financial development leads to economic growth.

Historically, the debate over the role of the structure of the financial system for economic activity has revolved around the comparative merits and limitations of banks vs. stock markets in stimulating economic growth. The research traditionally focused on the comparison between UK and US as market-based versus Japan and Germany as bank-based systems (e.g. Goldsmith 1969; Allen, Gale 2000; Arestis *et al.* 2001, 2008). But these types of broad distinction based on these four industrialized countries, which have analogous growth rates cannot be generalized (Beck, Levine 2002; Levine 2002). Recently, Levine (2005), summarized the related arguments by grouping them into four views. Proponents of bank-based structure argue that banks and other financial intermediaries are in a much better position to address agency problem and short-termism (Stiglitz 1985; Singh 1997; Allen, Gale 2000). Thus, banks perform better in allocating resources and promoting economic development. Correspondingly, those who favor market-based structure focus on the problems created by powerful banks. Bank-based systems may involve intermediaries that have huge influence over firms and this influence may damage economic growth (Rajan 1992). Besides, banks tend to be more cautious by nature and so bank-based systems may stymie economic innovation and impede economic growth (Levine 2002; Beck, Levine 2004). Furthermore, liquid and well-functioning financial markets foster growth and profit incentives and facilitate richer and flexible risk management tools for agents; while banks can only provide basic risk management services. There are also some financial economists who reject the importance of distinguishing the financial system as bank-based or market-based, but argue that markets and banks provide complementary services (Merton 1995; Merton, Bodies 1995). *Finally*, some studies hold the “law and finance” view which emphasizes the importance of the legal system in financial development, and that “... distinguishing countries by the efficiency of national legal systems in supporting financial transactions is more useful than distinguishing countries by whether they have bank-based or market-based financial systems” (Levine 2005: 887).

Though, quite a few number of empirical studies have been carried out on the growth impacts of bank-based and market-based structure, yet the studies have been unsuccessful in explaining the evolving importance of financial structure on the growth process. In this paper, we examined the evolving importance of banks and markets during the

process of economic development in India. In particular, we evaluated the sensitivity of economic development towards increases in bank and stock market development. Further, the optimal financial structure for India was calculated and its dynamics with economic development was examined. The impact of deviation from the optimal financial structure on the economic growth was also assessed. Specifically, we test whether the deviations from the optimal structure are associated with lower levels of economic activity.

The study contributes to the literature in a number of ways. To our knowledge the present study is one of the pioneer works in calculating the optimal financial structure in Indian context. *Secondly*, we have used Principal Component Analysis (PCA) to avoid the multi-collinearity problem among the different financial development indicators. *Lastly*, we have used quantile regressions for testing the sensitivities of financial structure and economic development. Quantile regression gives a more comprehensive picture of the effect of the economic activity on the financial structure.

2. Model specification, data and methodology

Economists hold different perspectives on the theoretical link between financial development and economic growth. Both the McKinnon-Shaw approach and the endogenous growth literature contends that financial development affects economic growth by acting on the savings rate, allocating resources more efficiently, increasing the productivity of capital which results in higher growth. Whereas, Robinson's hypothesis states that when an economy expands more financial institutions, financial products and services will emerge in response to greater demand for financial services (Robinson 1952). The cost of financial services involves a significant fixed component so average costs will fall if the volume of transaction increases. This implies wealthier economies will have a greater demand for financial services and more able to afford a costly financial system. Further, the level of real economy activity crucially affects the level of financial development (Ang 2008).

The theoretical literature predicts financial development to be a positive function of real rate of interest. This prediction is common to both the McKinnon-Shaw models and the endogenous growth literature. A positive real interest rate, in these models, increases financial depth through the increased volume of financial saving mobilisation and promotes growth through increasing the volume and productivity of capital. Higher real interest rates exert a positive effect on the average productivity of physical capital by discouraging investors from investing in low return projects (World Bank 1989; Fry 1997).

Based on the theoretical arguments discussed above, we can describe the economic growth relationship as follows:

$$Y = f(P, S, X), \quad (1)$$

where Y refers to log per capita GDP, P is the banking development index, S is the stock market development index and X is the real rate of interest. As our objective is to evaluate the sensitivity of economic development towards increases in bank and stock market development, the above model fits our purpose quite well. In this study, we do not nail down the causal mechanism between financial structure and economic activity. Similar type of models have already been used by Demircuc-Kunt *et al.* (2011);

Singh (2008); Rousseau, Vuthipadadorn (2005); Demetriades, Hussein (1996) in their study on relationship between economic growth and financial development.

The relationship between economic activity and the structure of financial system has been analyzed using several standard measures of financial depth and stock market development. Annual data from 1988 to 2009 for all OECD³ countries (Czech Republic and Slovak Republic has been dropped due to data constraint) and India has been used in the study. Table 1 provides the primary source of the used indicators in the study.

Table 1. Sources of data

Name	Source	Definition
Private credit	Beck <i>et al.</i> (2009) WB Database	Ratio of domestic credit issued to private sector by banks and other financial intermediaries to GDP
Liquid liabilities	Beck <i>et al.</i> (2009) WB Database	Ratio of liquid liabilities of the financial system to GDP
Overhead costs	Beck <i>et al.</i> (2009) WB Database	Ratio of overhead costs to total bank assets
Net interest margin	Beck <i>et al.</i> (2009) WB Database	Difference between bank interest income and interest expenses divided by total assets
Stock market capitalisation	Beck <i>et al.</i> (2009) WB Database	Stock market capitalization relative to GDP
Turnover ratio	Beck <i>et al.</i> (2009) WB Database	Ratio of trades in domestic shares to market capitalization
Total value traded	Beck <i>et al.</i> (2009) WB Database	Ratio of trades in domestic shares to GDP
GDP per capita	World Development Indicators	Log real GDP per capita (constant 2000 USD)
Real rate of interest	World Development Indicators	Nominal rate of interest minus inflation
Legal origin	La Porta <i>et al.</i> (1998)	Set of four dummy variables that refer to the legal origin of each country: British, French, German and Scandinavian
Population size	World Development Indicators	Based on the de facto definition of population
Population density	World Development Indicators	Population density is midyear population divided by land area in square kilometers
Distance	La Porta <i>et al.</i> (2002)	Latitude
Natural resource rents	World Development Indicators	Total natural resources rents are the sum of oil rents, natural gas rents, coal mineral rents, and forest rents as a percentage of GDP

³ The OECD countries in the sample are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, The Republic of Korea, Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, and United States.

We would have liked to include the measures of both bond market and money market. But in the Indian context both these markets' volume are very thin, which makes it difficult for any meaningful interpretation. This can be supplemented with the fact that corporate bond market accounted for only 3.9% of the sources of funds of large Indian companies in 2010–2011 (Banerji *et al.* 2011). Hence, we have focused only on the banks and stock markets while analyzing evolving importance of financial development on economic growth. Private credit has been used to measure financial depth. Private credit equals credit issued to the private sector as a share of Gross Domestic Product (GDP). It excludes credit issued to government, government agencies and public enterprises. Few researchers have also used monetary aggregates, e.g. liquid liabilities to GDP as proxy for financial depth. The ratio of overhead costs to total bank assets and net interest margin has been used for measuring the efficiency of the financial intermediation process. In the short run, high overhead costs may be related to investments by competitive banks in improving financial services, but over a longer time period, high overhead costs are likely to reflect inefficiency and lack of competition (Kutivadze 2011). Similarly, high value of net interest margin tends to suggest lack of competition among banks. To measure stock market development, we use stock market capitalization which equals the value of listed domestic shares on domestic stock exchange divided by GDP and other liquidity-based measures of stock market development like turnover ratio and total value traded ratio.

Diversity of financial services catered by the financial system makes construction of financial development indicator a difficult task. Despite all efforts made by researchers to refine and improve the existing measures, the financial proxies used are far from satisfactory. At most all the measures adopted in previous studies are highly correlated among each other and suffer from several limitations. In order to alleviate this problem, we have constructed a new aggregate index for financial development using PCA from the above discussed measures of bank and stock market development. The PCA takes N specific indicators and produces new indices (the principal components) X_1, X_2, \dots, X_N that are mutually uncorrelated. Each principal component, as a linear combination of the N indicators captures a different dimension of the data. Using this methodology, we have constructed two different indices; one for the banking sector development and another for the stock market development.

We have used log real GDP per capita which equals the logarithm of GDP per capita in constant 2000 U.S. Dollars for measuring economic activity. Real rate of interest is calculated as nominal rate of interest minus inflation. Apart from this, we have used different standard controls for controlling key institutional, geographic and structural traits that have been widely employed in the development literature. In specific, for controlling geographic characteristics and economic structure of the country we have used country's distance from equator, population size and density, along with natural resources export (Beck 2010). We have also included dummy variables for the legal origin of the country (British, French, German and Scandinavian).

Mixture of banks and markets operating in an economy is measured by the financial structure ratio, which equals private credit divided by security market capitalization.

This ratio will also be referred to as the actual structure prevailing in an economy at a particular period of time. A higher ratio implies the economy is more bank based where as a lower ratio implies the economy is more market based.

First, we test the evolving importance of banks and markets with that of economic development in India. Though, we apply both OLS and quantile regression to assess how the relationship between log real GDP per capita and financial development has changed with the development of Indian economy, our emphasis will be on the estimates of quantile regression. This is because quantile regression developed in Koenker and Bassett (1978), provides a complete picture of the covariate effect (i.e. financial development indices) when a set of percentiles is modeled on the dependent variable (i.e. log real per capita GDP). It offers the ability to capture important features of the data that might be missed by models that average over the conditional distribution. In contrast to OLS, which minimizes the sum of squared residuals, quantile regression minimizes the weighted sum of absolute deviations, obtaining, e.g. the 10th or 75th quantiles by appropriately weighting the residuals. Because it makes no distributional assumption about the error term in the model, quantile regression offers considerable model robustness. Based on the theoretical considerations discussed above, the following model specification of the steady-state equation for economic growth is tested using both OLS and quantile regression:

$$Y_t = \beta_1 P_t + \beta_2 S_t + \beta_3 X_t + \varepsilon_t \quad (2)$$

where Y_t = log real per capita GDP, P_t = Index of banking sector development, S_t = Index of stock market development, X_t = Real rate of interest.

After accessing the importance of banks and markets we compute the optimal financial structure. We adopt the approach followed by Rajan, Zingales (1998), Demirguc-Kunt *et al.* (2011) for constructing optimal financial structure. Like Demirguc-Kunt *et al.* (2011), who have benchmarked on the OECD countries, we also maintain the hypothesis that OECD countries have few impediments for development of their financial markets and intermediaries. Hence, OECD countries have the most advanced and developed financial market and intermediaries. As these countries are the most developed economies in the world, hence their financial structure can be safely assumed to have attained the optimal structure, after conditioning on key national characteristics.

To compute the optimal financial structure, we first selected the benchmark OECD countries. For the benchmark countries we estimated:

$$\text{Actual structure}_{c,t} = a \times Y_{c,t} + b \times X_{c,t} + v_{c,t} \quad (3)$$

where $Y_{c,t}$ = log real per capita GDP; $X_{c,t}$ includes: LO, Equator, PopSize, PopDen, and Natural Res.

These estimated parameters from the Eqn. 2 are used to construct the optimal structure for India. The optimal financial structure is calculated for each year. Then the financial structure gap is constructed. The financial structure gap equals the natural logarithm of the absolute value of the difference between the actual financial ratio and the estimated

optimal financial structure ratio. The gap gives us an idea whether the country is deviating from its optimal structure regardless of the fact that whether it is bank-based or market-based.

After obtaining the financial structure gap, we assess the impact of financial structure gap with the economic development using the following specification:

$$Y_t = \beta_1 P_t + \beta_2 S_t + \beta_3 FSG_t + \varepsilon_t, \quad (4)$$

where Y_t = log real per capita GDP; P_t = Index of banking sector development; S_t = Index of stock market development; FSG_t = Financial Structure Gap.

In order to examine whether the deviations of an economy's actual financial structure from its estimated optimal mixture of banks and markets are associated with less economic activity, we have included the financial structure gap variable in the specification. The financial structure gap is our estimate of deviations of financial structure from the estimated or optimal level at a particular stage of economic development. The result from the equation 2 showed that the real rate of interest appeared insignificant, hence we have not included that in our final specification in equation 4, although we have checked the results using real rate of interest. The financial structure gap measures deviations of actual financial structure from the estimated optimum structure. The larger values indicate bigger deviations, irrespective of the deviations arising whether the country is too bank-based or too market-based. As the economies tend to increase their demand for the services provided by the financial sector, then it has been empirically proved by Demircuc-Kunt *et al.* (2011), that deviation from the optimal financial structure – financial structure gap is associated with lower levels of economic activity. By focusing on the financial structure gap, we stress the evolving importance of banks and markets rather than the actual structure. This will help in better understanding of the dynamic relationship persisting among banks, security market and economic development.

3. Results and analysis

The correlations in Table 2 (A) and (B) highlight key features about the banking sector development and the stock market development. The banking sector development indicators private credit is highly correlated with liquid liability, net interest margin and overhead cost. Both overhead cost and net interest margin are negatively correlated with private credit and liquid liability. This highlights the inefficiency of the financial sector in India. Negative value indicates lack of competition in the intermediary sector. This is true for the Indian banking sector. There is restriction on the opening of new banks and the sphere is predominantly dominated by state-owned banks (Andrianova *et al.* 2008).

Similarly, for the stock market development indicators, market capitalization is highly correlated with total value traded and negatively correlated with turnover ratio. The high correlation among the regressors may make the regression coefficients insignificant. To alleviate this problem separate index for banking sector and stock market has been built using principal component analysis.

Table 2A. Correlation matrix of banking sector development indicators

	Private credit	Liquid liabilities	Net interest margin	Overhead cost
Private credit	1.00			
Liquid liabilities	0.95	1.00		
Net interest margin	-0.70	-0.60	1.00	
Overhead cost	-0.92	-0.96	0.52	1.00

Table 2B. Correlation matrix of stock market development indicators

	Market capitalisation	Turnover ratio	Total value traded
Market capitalisation	1.00		
Turnover ratio	-0.21	1.00	
Total value traded	0.86	0.29	1.00

We have used private credit, liquid liability, overhead cost and net interest margin to develop a summary measure of the banking sector development. Table 3 presents the results obtained from principal component analysis. The eigenvalues indicate that the first principal component explains about 83.7% of the standardized variance, the second principal component explains another 14.0% and the last principal component accounts for 0.08% of the variation. The first principal component is computed as a linear combination of the four banking sector development indicator with weights given by the first eigenvector. In this case, the first two largest principal components are extracted and they are able to compute upto 97.8% of the information from the original data set. The remaining principal components are not considered since their marginal information content is relatively small. For constructing a single index out of the first two principal components, the weights are divided proportionately depending upon the variance explaining capacity of the component. In this connection, the first principal component which accounts for 83.7% of the total variation has a weight of $83.7/97.8$ and so on.

Table 3. Principal component analysis for banking sector development index

	PCA1	PCA2	PCA3	PCA4
Eigenvalue	3.350	0.562	0.0527	0.0352
% of variance	0.837	0.140	0.013	0.008
Cumulative %	0.837	0.978	0.991	1.00
Variable	Vector 1	Vector 2	Vector 3	Vector 4
Private credit	0.5359	0.0623	0.7822	-0.3116
Liquid liabilities	0.53	0.2518	-0.0616	0.8074
Net interest margin	-0.4064	0.8893	0.2098	0.0055
Overhead cost	-0.5164	-0.3767	0.5834	0.501

Similarly, for stock market, we have used market capitalization, total value traded and turnover ratio to develop the summary measure. Table 4 presents the result obtained from the principal component analysis for these variables. The eigenvalues indicate that the first principal component explains about 62.0% of the standardized variance, the second principal component explains another 37.4% and the last principal component accounts for 0.05% of the variation. In this case, the first two largest principal components are extracted and they are able to compute upto 99.5% of the information from the original data set. The weight of the first principal component has been assigned as 62.0/99.5 and for the second principal component the weight is 37.4/99.5.

Table 4. Principal component analysis for stock market development index

	PCA1	PCA2	PCA3
Eigenvalue	1.861	1.122	0.017
% of variance	0.620	0.374	0.005
Cumulative %	0.620	0.995	1.00
Variable	Vector 1	Vector 2	Vector 3
Market capitalisation	0.696	-0.2846	0.6592
Total value traded	0.715	0.1906	-0.6726
Turnover ratio	0.0658	0.9395	0.3361

By setting 1988 as the base year, the resulting index for banking development is presented in left panel of Figure 1. A rise in the index indicates increase in the financial depth on account of the banking sector development. The index quite well captures the policy changes happened during this period. As is evident in the index, the financial

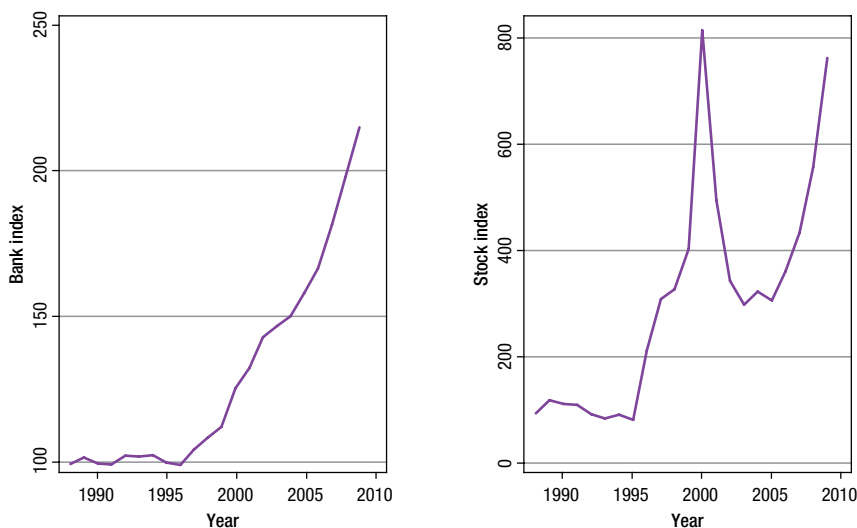


Fig. 1. Comparison of banking sector and stock market index

depth was quite low upto 1995. The effect of liberalization policies adopted in 1992 has slowly but steadily increased the financial depth of the Indian economy. The rise in index after 1995 coincides with the entry of nine new private banks during 1994–1996 and reduction in reserve requirements during this period. Further deregulation of interest rates, reduction of reserve requirements, and new set of prudential norms during the early 2000s has resulted in increasing the financial depth and efficiency of the banking sector (Mohan 2006) which can be evidenced from the index.

The stock market development index bears a quite different picture. Unlike the banking development index, which depicts an increasing growth trajectory, stock market development index constitutes of few sharp rise and falls. Like the banking development index, the base year for the stock market development index has been set at 1998 and the resulting index is presented in the right panel of Figure 1. The stock market has grown significantly after 1995 which can be attributed to the stable and uniform system, procedure and regulations in the form of SEBI. Until 1992 stock markets remain backward with little scope for expansion due to the dominance of state directed programs of the Government. After bringing all capital market related issues under the gambit of SEBI and the abolition of financial repression policies, stock market has grown many folds. The stock market development index plummeted in 2001 due to the globally prevailing dot-com bubble, September 11 attacks on US and increasing oil price (Mukherjee 2007). It has again resurrected past 2005. The fluctuations in the stock market are more in comparison to the banking development index due to the high risk perceived with capital market. The index is able to capture all the reflections of economic events quite well.

After construction of the indices of stock market development and banking sector development, we checked for the stationarity of all the variables. The Augmented Dickey Fuller (ADF) unit root test results⁴ suggest that all the variables, except stock market development index are stationary at level (5% significance level). However, the ADF test is known to suffer from low power and size-misspecifications. Hence, we have used the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test which tests the null of stationarity against the alternative of a unit root. The test results of KPSS suggest that the stock market development index is stationary at level (5% significance level). Thereafter, we began with OLS and quantile regression to access the changing relationship amongst economic activity, banking sector development and stock market development of India. OLS provides information about the relationship at the average level of economic development whereas quantile regressions provide this relationship at different levels of economic development. By computing quantile regressions for each of the 5th to the 95th percentile, we access how the relationship between economic development and financial development differs across distinct levels of log real GDP per capita. It must be made clear that, in this analysis we are not testing for the causal impact of financial development on economic growth.

Table 5 shows the result of OLS and quantile regression analysis. From the result, it is evident that banking sector development index affects the GDP significantly, whereas the stock market development index does not have any impact on the growth process.

⁴ The results of unit root test are not reported here to conserve space but are available on request.

So it can be argued that the banking sector is the driver of the growth process of Indian economy. In the regression analysis we have included the real interest rate following Mckinnon-Shaw framework. Mckinnon-Shaw framework has observed that financial repression by way of interest rate controls retard economic growth. Hence, they have advocated of financial liberalization policy. Removing interest rate barrier was one of them. But as the results indicate, the interest rate has not played any significant role in the growth process during the study period. This may be due to the fact that study period starts from 1988 when all interest rate barriers have been removed and liberalization policy had been adopted across the board in the economy.

Table 5. OLS and quantile regression estimates of GDP for India

GDP	OLS	Quantile regression
bankindex	2.351*** (7.91)	2.684*** (5.08)
stockindex	0.092 (1.63)	0.088 (0.84)
realroi	-0.003 (-0.27)	-0.007 (-0.44)
_cons	9.170*** (70.01)	9.094*** (42.89)
R-squared	0.9167	0.7116

Notes: t statistics in parentheses, ***, ** and * denotes coefficient estimates at 1, 5 and 10 percent level of significance.

Figure 2 plots the coefficients from quantile regression for each of the 5th to 95th percentiles of log real GDP per capita with the OLS estimates. Here the dependent variable is the log real GDP per capita and the regressors are respectively bank and stock market development index. The left axis provides information on the value of the coefficient estimates. The top left panel of Figure 2 shows that the marginal increase in log real GDP per capita is associated with an increase in the banking sector development index. This means that the sensitivity increases with the rise in quantiles. Similarly, for the stock market development index the marginal increase in log real GDP per capita is associated with a decrease in the stock market development index. This implies that the sensitivity falls with the rise in quantiles. The results suggest that the relationship between bank index and economic development is different from that of stock index and economic development. Whereas, the sensitivity rises in case of banking sector, the sensitivity falls with stock market indicators. This provides evidence that the financial structure of Indian economy is still more bank-based. This is in contradiction with Allen and Gale (2000), who had opined that with the increased level of economic development the financial structure becomes more market based. This may be attributed to the institutional and Government policy environment, regulations and other factors. Again despite the liberalization of financial system, it appears that the repressionist measures still exist in the form of subsidized credit to certain priority sector. R.B.I. has tightened the supervision and regulation mechanism in recent years to ensure priority sector credit

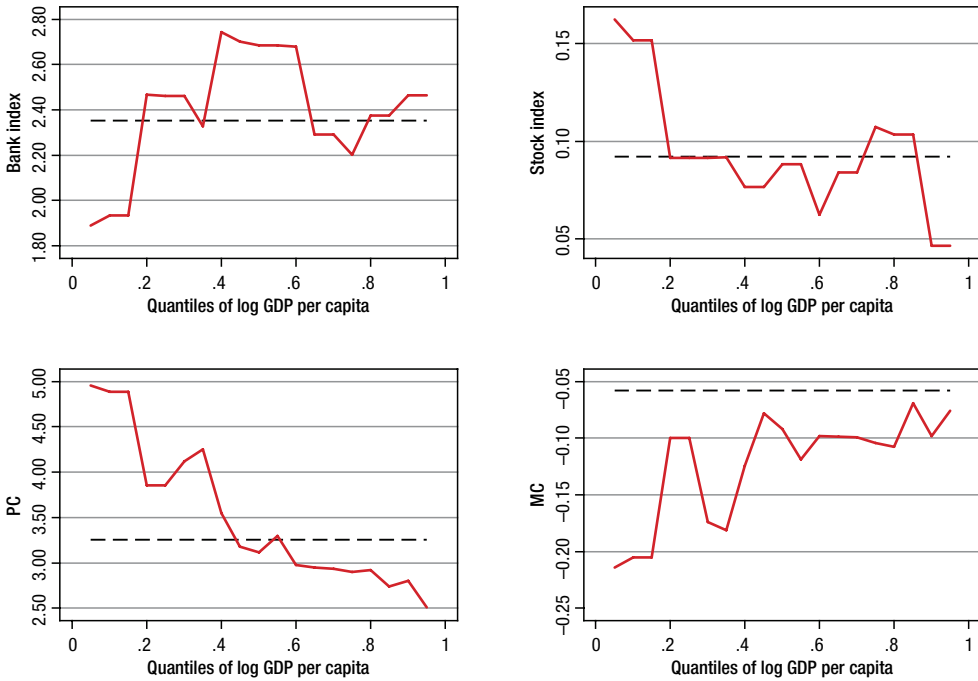


Fig. 2. Quantile and OLS coefficients of banking sector and stock market development index, private credit and market capitalisation

is met. Although the Indian Government has divested parts of its holding, Indian banking system still remains predominantly state-owned (Andrianova *et al.* 2008).

It is interesting to analyze the dependence of economic agents on external finance in the context of financial structure. The dependence on external finance is captured by the credit to private sector and the stock market capitalization indicators. We regressed these indicators with log real GDP per capita. The bottom panel of the Figure 2 depicts the results obtained from the quantile regression. The sensitivity of private credit falls with marginal increase in the level of economic development. Similarly, for market capitalization the sensitivity increases with marginal increase in the level of economic development. This implies that with higher levels of economic development, economic agents depend more on the stock market for their external finance needs. This is in line with the findings of Allen and Gale (2000) who argue that economic development increases the role of stock market for external finance needs.

But, when we consider the financial system as a whole and compare their functions with the development process, we found that Indian economy is still bank based. This can be evidenced from the top panel of the Figure 2. Our findings are consistent with Singh (1997), Nagaishi (1999) and Herd *et al.* (2011). In their recent study Herd *et al.* (2011), has observed that though large corporate houses depend on stock market for their finance, but overall it is the services of banks that are more important to the Indian economy.

After examining the relative importance of banks and stock markets for economic growth in India, we moved on to construct the optimal financial structure. We test whether the deviation from the optimal structure has affected the growth process. For this we regressed the actual financial structure of set of the OECD countries on their GDP per capita while controlling for other geographic and economic characters like distance from equator, legal origin, population density and distribution, etc. The coefficients derived from this are used to construct the optimal financial structure of India. We have used both OLS and robust regression for obtaining the coefficients. Robust regression reduces the impact of outliers on the coefficient estimates. Outliers or influential observations exert disproportionately large influence on the coefficient estimates. Table 6 discusses the results obtained from both the tests.

Table 6. Financial structure ratio regression (estimated on OECD samples)

finstr	OLS	Robust regression
gdp	-2.546*** (-8.19)	-0.357*** (-3.14)
blo	-1.296 * (-2.60)	-0.810*** (-4.43)
flo	-1.814 *** (-4.63)	-0.206 (-1.43)
svlo	-0.832 (-1.49)	-0.547* (-2.67)
dis	0.013* (1.73)	-0.0027 (-0.99)
ps	-0.087 (-0.69)	0.054 (1.13)
pd	0.003 (0.02)	-0.030 (-0.55)
natres	0.049 (0.89)	0.027 (1.34)
cons	29.61*** (8.17)	5.091*** (3.83)
R-square	0.15	0.08

Notes: t statistics in parentheses, ***, ** and * denotes coefficient estimates at 1, 5 and 10 percent level of significance.

The result indicates that the log GDP per capita significantly affects financial structure in both the OLS and robust regression. Among, other control variables legal origin appears to affect the financial structure. The negative coefficient of log GDP per capita indicates that the financial structure ratio falls as economy grows and financial system becomes more market based. For constructing the optimal financial structure of India, we take the significant coefficients obtained by robust regression. We choose robust regression instead of OLS due to former’s ability to reduce the impact of outliers on the coefficient estimates.

After computing the optimum financial structure, the financial structure gap is computed every year. The financial structure gap is the logarithm of absolute value of the financial structure and the estimated financial structure. And it is the deviation from the optimum financial structure at a particular level of economic development. It can potentially take on values between negative and positive infinity. Smaller values denote smaller deviations from the estimated optimum structure. We obtain the quantile coefficients of financial structure gap for different levels of log real GDP per capita. Figure 3 represents the estimates from the quantile regression.

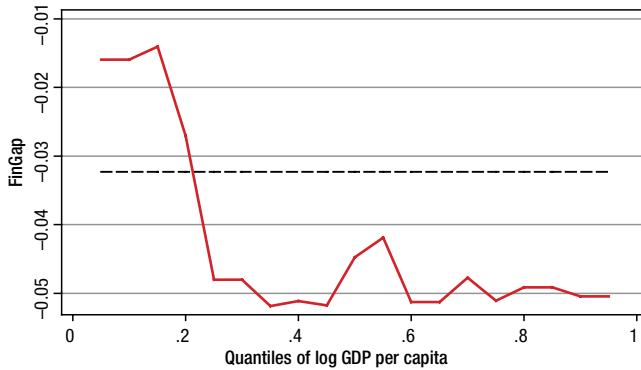


Fig. 3. Quantile coefficients of financial structure gap

From the Figure 3, it can be evidenced that the financial structure gap diminishes with higher levels of log real GDP per capita. At lower levels of economic development, the financial structure gap is more pronounced. Next we examine the relationship between the log real GDP per capita and the financial structure gap using OLS and quantile regression. Table 7 summarizes the results.

Table 7. OLS & quantile regression estimates of financial structure gap

GDP	OLS	Quantile regression
bankindex	2.424*** (11.29)	2.702*** (9.22)
stockindex	0.690 (1.65)	0.004 (0.10)
FSG	-0.032*** (-3.33)	-0.045 ** (-2.85)
_cons	9.080*** (137.43)	9.016 *** (88.27)
R2	0.95	0.80

Notes: t statistics in parentheses, ***, ** and * denotes coefficient estimates at 1, 5 and 10 percent level of significance.

The results depict that the financial structure gap affects the log of real per capita GDP. The estimated coefficient is negative signalling that the financial structure gap is retarding the growth process. Increase in financial structure gap is resulting in the reduction of economic activity at each level of log GDP per capita. Hence, the financial structure gap matters for the growth process. The economic magnitude of the relationship between economic activity and financial structure gap is quite large. As evident from the above table a one-standard deviation increase in financial structure gap is associated with a drop in log real GDP per capita by nearly seven percent. Thus for example, such an increase in the financial structure gap would involve a drop in 2009 real GDP per capita from 766 USD to 712 USD. The estimated coefficients from bank index and stock index are consistent with earlier research (Beck, Levine 2004; Levine, Zervos 1998).

Conclusion

In this paper, we have attempted to alleviate the difficulty of measuring financial development by using principal component analysis. The constructed index for banking and stock market quite well captures the underlying financial and economic environment. Using this index and applying quantile regression, we have provided an exploration of the evolving importance of banks and markets during different stages of economic development in India. The test results suggest that as India has developed, the sensitivity of economic output to changes in banking sector index has increased, whereas, the sensitivity of the economic output to the stock market index has decreased. This suggests that services provided by the banks are comparatively more important than those provided by the stock markets in the development process. But if we consider dependence of the economic agents on external finance need, then the stock market performs better. Our findings are consistent with the findings of Herd *et al.* (2011), who have concluded that though the stock market is a very efficient allocator of finance for large companies in India, still the banking system provides more capital to private corporations than the stock market. This implies that the stock market in India is not performing its functions effectively and efficiently. In the long run, the financial structure of India is bank based. This finding is in accordant with the findings of Stiglitz (1985); Singh (1997); Allen, Gale (2000), who have advocated for bank based structure in the growth process. The bank-based structure of India can be attributed to the existing institutional and policy framework. It is interesting to mention that though Indian financial system has been liberalized since 1991, still repressionist policies coexist with other liberalized policies. State control over the banking sector, regulated measures of capital control have made the financial system more dependent on banks.

Next, we estimated the optimal financial structure and accessed its deviation from the actual financial structure. We found that financial structure gap matters for Indian economy. Deviations from the optimal structure are associated with less economic activity. The economic magnitude of the relationship between economic activity and financial structure gap is large. The study results are in line with the study of Demirguc-Kunt *et al.* (2011) who have concluded that the financial structure matters for the growth

process. Finally, as it is observed that the financial structure gap has harmful effects on the economy, we advocate for a second wave of financial reforms (Herd *et al.* 2011), to reorient the financial sector policies to minimize the gap between the optimal financial structure and the existing structure.

References

- Ahmed, A. D.; Islam, S. M. N. 2009. *Financial liberalization in developing countries: issues, time series analyses and policy implications. Contributions to economics*. Heidelberg: Physica-Verlag.
- Allen, F.; Gale, D. 2000. *Comparing financial systems*. Cambridge and London: MIT Press.
- Andrianova, S.; Demetriades, P.; Shortland, A. 2008. Government ownership of banks institutions, and financial development, *Journal of Development Economics* 85: 218–252. <http://dx.doi.org/10.1016/j.jdeveco.2006.08.002>
- Ang, J. B. 2008. What are the mechanisms linking financial development and economic growth in Malaysia, *Economic Modelling* 25: 38–53. <http://dx.doi.org/10.1016/j.econmod.2007.04.006>
- Ang, J. B.; McKibbin, W. J. 2007. Financial liberalization, financial sector development and growth: evidence from Malaysia, *Journal of Development Economics* 84: 215–233. <http://dx.doi.org/10.1016/j.jdeveco.2006.11.006>
- Arestis, P.; Demetriades, P. O.; Luintel, K. B. 2001. Financial development and economic growth: the role of stock markets, *Journal of Money, Credit, and Banking* 33: 16–41. <http://dx.doi.org/10.2307/2673870>
- Arestis, P.; Khan, M.; Luintel, K. B.; Theodoridis, K. 2008. Financial structure and economic growth, *Journal of Development Economics* 86: 181–200. <http://dx.doi.org/10.1016/j.jdeveco.2007.11.006>
- Banerji, S.; Gangopadhyay, K.; Patnaik, I.; Shah, A. 2011. New thinking on corporate bond market in India, *Working Paper No. 6/2012-DEA*. Ministry of Finance, Government of India.
- Beck, T. 2010. Finance and oil: is there a resource curse in financial development? *European Banking Centre, Discussion Paper No. 4*. Tiburg University.
- Beck, T.; Demirguc-Kunt, A.; Levine, R. 2009. Financial institutions and markets across countries and over time – data and analysis, *Policy Research Working Paper No. 4943*. The World Bank.
- Beck, T.; Levine, R. 2002. Industry growth and capital accumulation: does having a market- or bank-based system matter?, *Journal of Financial Economics* 64: 147–180. [http://dx.doi.org/10.1016/S0304-405X\(02\)00074-0](http://dx.doi.org/10.1016/S0304-405X(02)00074-0)
- Beck, T.; Levine, R. 2004. Stock markets, banks, and growth: panel evidence, *Journal of Banking and Finance* 28: 423–442. [http://dx.doi.org/10.1016/S0378-4266\(02\)00408-9](http://dx.doi.org/10.1016/S0378-4266(02)00408-9)
- Beck, T.; Levine, R.; Loayza, N. 2000. Finance and the sources of growth, *Journal of Financial Economics* 58: 261–300. [http://dx.doi.org/10.1016/S0304-405X\(00\)00072-6](http://dx.doi.org/10.1016/S0304-405X(00)00072-6)
- Bekaert, G.; Harvey, C. R.; Lundblad, C. 2006. Growth volatility and financial liberalization, *Journal of International Money and Finance* 25: 370–403. <http://dx.doi.org/10.1016/j.jimonfin.2006.01.003>
- Bell, C.; Rousseau, P. L. 2001. Post-independence India: a case of finance-led industrialization, *Journal of Development Economics* 65: 153–175. [http://dx.doi.org/10.1016/S0304-3878\(01\)00132-8](http://dx.doi.org/10.1016/S0304-3878(01)00132-8)
- Cobham, D.; Subramaniam, R. 1998. Corporate finance in developing countries: new evidence for India, *World Development* 26(6): 1033–1047. [http://dx.doi.org/10.1016/S0305-750X\(98\)00025-4](http://dx.doi.org/10.1016/S0305-750X(98)00025-4)

- Corbett, J.; Jenkinson, T. 1996. The financing of industry, 1970–1989: an international comparison, *Journal of the Japanese and International Economies* 10(1): 71–96. <http://dx.doi.org/10.1006/jjie.1996.0004>
- Demetriades, P. O.; Hussein, K. A. 1996. Does financial development cause economic growth? Time-series evidence from sixteen countries, *Journal of Development Economics* 51: 387–411. [http://dx.doi.org/10.1016/S0304-3878\(96\)00421-X](http://dx.doi.org/10.1016/S0304-3878(96)00421-X)
- Demirguc-Kunt, A.; Feyen, E.; Levine, R. 2011. The evolving importance of banks and securities markets, *Working Paper* No 5805. World Bank Policy Research.
- Demirguc-Kunt, A.; Levine, R. 2001. *Financial structures and economic growth: a cross-country comparison of banks, markets and development*. Cambridge, MA: MIT Press.
- Demirguc-Kunt, A.; Maksimovic, V. 1996. Stock market development and financing choices of firms, *World Bank Economic Review* 10(2): 341–369. <http://dx.doi.org/10.1093/wber/10.2.341>
- Demirguc-Kunt, A.; Maksimovic, V. 2002. Funding growth in bank-based and market-based financial systems: evidence from firm-level data, *Journal of Financial Economics* 65: 337–363. [http://dx.doi.org/10.1016/S0304-405X\(02\)00145-9](http://dx.doi.org/10.1016/S0304-405X(02)00145-9)
- Fry, M. J. 1997. In defence of financial liberalization, *Economic Journal* 107(442): 754–770. <http://dx.doi.org/10.1111/1468-0297.00191>
- Goldsmith, R. W. 1969. *Financial structure and development*. New Haven, CT: Yale University Press.
- Herd, R.; Koen, V.; Patnaik, I.; Shah, A. 2011. Financial sector reform in India: time for a second wave?, *Working Papers* No. 879. OECD Economics Department.
- King, R. G.; Levine, R. 1993. Finance and growth: Schumpeter might be right, *Quarterly Journal of Economics* 108: 717–737. <http://dx.doi.org/10.2307/2118406>
- Koenker, R.; Bassett Jr., G. 1978. Regression quantiles, *Econometrica* 46: 33–50. <http://dx.doi.org/10.2307/1913643>
- Kutivadze, N. 2011. Public debt and financial development, *Working Paper* No. 2011-13. University of Milano.
- La Porta, R.; Lopez-de-Silanes, F.; Shleifer, A.; Vishny, R. W. 1997. Legal determinants of external finance, *Journal of Finance* 52: 1131–1150. <http://dx.doi.org/10.1111/j.1540-6261.1997.tb02727.x>
- La Porta, R.; Lopez-de-Silanes, F.; Shleifer, A.; Vishny, R. W. 1998. Law and finance, *Journal of Political Economy* 106(6): 1113–1155. <http://dx.doi.org/10.1086/250042>
- Levine, R. 2005. Finance and growth: theory and evidence, in P. A. Aghion, S. N. Durlauf (Eds.). *Handbook of economic growth*, vol. 1 (A), chapter 12. Elsevier, 865–934.
- Levine, R. 2002. Bank-based or market-based financial systems: which is better?, *Working Paper* No. 9138. National Bureau of Economic Research.
- Levine, R. 1997. Financial development and economic growth: views and agenda, *Journal of Economic Literature* 35: 688–726.
- Levine, R.; Loayza, N.; Beck, T. 2000. Financial intermediation and growth: causality and causes, *Journal of Monetary Economics* 46: 31–77. [http://dx.doi.org/10.1016/S0304-3932\(00\)00017-9](http://dx.doi.org/10.1016/S0304-3932(00)00017-9)
- Levine, R.; Zervos, S. 1998. Stock markets, banks, and economic growth, *American Economic Review* 88: 537–558.
- Lin, J. Y.; Sun, X.; Jiang, Y. 2009. Towards theory of optimal financial structure, *Policy Research Working Paper* No 5038. World Bank.
- Luintel, K. B.; Khan, M. 1999. A quantitative reassessment of the finance-growth nexus: evidence from a multivariate VAR, *Journal of Development Economics* 60: 381–405. [http://dx.doi.org/10.1016/S0304-3878\(99\)00045-0](http://dx.doi.org/10.1016/S0304-3878(99)00045-0)

- Merton, R. C. 1995. A functional perspective of financial intermediation, *Financial Management* 24: 23–41. <http://dx.doi.org/10.2307/3665532>
- Merton, R. C.; Bodie, Z. 1995. A conceptual framework for analyzing the financial environment, in D. B. Crane, et al. (Eds.). *The global financial system: a functional perspective*. Boston, MA: Harvard Business School Press, 3–31.
- Mohan, R. 2006. Financial sector reforms and monetary policy: the Indian experience, *Reserve Bank of India Bulletin*. Mumbai.
- Mukherjee, D. 2007. Comparative analysis of Indian stock market with international markets, *Great Lakes Herald* 1(1): 39–71.
- Nagaishi, M. 1999. Stock market development and economic growth: dubious relationship, *Economic and Political Weekly* 34(29): 2004–2012.
- Rajan, R. G. 1992. Insiders and outsiders: the choice between informed and arm's-length debt, *Journal of Finance* 47: 1367–1399. <http://dx.doi.org/10.1111/j.1540-6261.1992.tb04662.x>
- Rajan, R. G.; Zingales, L. 1998. Financial dependence and growth, *The American Economic Review* 88(3): 559–586.
- Ranciere, R.; Tornell, A.; Westermann, F. 2008. Systemic crises and growth, *Quarterly Journal of Economics* 123: 359–406. <http://dx.doi.org/10.1162/qjec.2008.123.1.359>
- Robinson, J. 1952. *The rate of interest and other essays*. London: Macmillan.
- Rousseau, P. L.; Vuthipadadorn, D. 2005. Finance, investment, and growth: time series evidence from 10 Asian economies, *Journal of Macroeconomics* 27: 87–106. <http://dx.doi.org/10.1016/j.jmacro.2003.09.004>
- Singh, A. 1997. Stock markets, financial liberalisation and economic development, *Economic Journal* 107(442): 771–782. <http://dx.doi.org/10.1111/j.1468-0297.1997.tb00042.x>
- Singh, T. 2008. Financial development and economic growth nexus: time-series evidence from India, *Applied Economics* 40(12): 1615–1627. <http://dx.doi.org/10.1080/00036840600892886>
- Singh, A.; Hamid, J. 1992. Corporate financial structure in developing countries, *World Bank-International Finance Corporation Papers* No. 1. World Bank.
- Stiglitz, J. E. 1985. Credit markets and the control of capital, *Journal of Money, Credit, and Banking* 17(1): 133–152. <http://dx.doi.org/10.2307/1992329>
- World Bank. 1989. *World Development Report 1989*. New York: Oxford University Press.

Pradeepta SETHI is a research scholar pursuing his Doctoral degree at the National Institute of Financial Management (an autonomous Institute of Ministry of Finance, Government of India). His research interests are in the areas of financial systems, financial development, economic growth, international finance and corporate finance.

Brajesh KUMAR is an Assistant Professor (Economics) at National Institute of Financial Management (an autonomous Institute of Ministry of Finance, Government of India). He has more than 15 years of teaching, training, and research experience. He has also been Consultant to the Ford Foundation, UNESCO and the UGC-sponsored projects. Dr Kumar is a recognized resource person in the area of Data Analysis in Social Sciences Research using statistical and econometric software. He has been Asst. Editor to a monthly Magazine titled “Monthly Economic Digest”. He is Managing Editor to biannual periodical titled “NIFM Journal of Public Financial Management”. His areas of interest include mathematical economics, business economics, managerial economics, and computer applications in economics, research methodology and econometrics.