MACRO IMPACT OF FINANCIAL INTEGRATION: AN EMPIRICAL STUDY OF PRE AND POST LIBERALIZED INDIA

GARGI SANATI[1]

Abstract

In the context of India's financial integration in the domestic and international front, this study proposes to study three major issues: First, the impact of financial development on the real sector growth; second, examining relative merit of bank or market based economy in the pre and post liberalization period for the growth of the real sector economy and third, the long run relationship of the development of banking sector and market economy with the growth of the real sector economy. We find positive and significant effect of the financial sector development for the period of 1980-2008. However, India depends more on the bank industry in the pre-liberalization period while it is evident that stock market play a significant complementary role in the post-liberalization period. Our finding also supports the conventional theory that at the early stages of economic development, banking industry fosters economic growth to a greater degree than market-based financial system. Also, long run relationship is evident among the bank lending channel, stock market development and the real sector growth. Despite significant evidence of integration between real and financial sector we find it is the development of macro-economy which leads the growth of financial sector and the transmission of finance for the growth of real sector economy is not significant. However, as long run equilibrium is evident between bank lending channel and market channel, external shocks may have adverse impact on the growth of the Indian economy through the non-availability of finance. Since stock market movement is much sensitive to external shocks, in the event of crisis, the linkage may be proven costlier for the growth of the real sector economy.

Keywords: Banks, International Financial Markets, Economic Integration, Economic Development and Financial Markets

JEL Classification: G21, G15, F15, O16

[1] Faculty research Associate, National Institute of Bank Management, Kondwa Khurd, Pune 411048.

1. Theoretical Underpinning

Since 1980s, the opening up of the domestic economy by most of the emerging countries has changed the institutional structure and significantly increased volume of capital transactions in the world market. Over time, financial integration has become one of the most controversial aspects of financial liberalisation given the speculative and volatile nature of internationally floated financial assets.[2] Following several crises, financial liberalisation by emerging countries has proved to be alarming. Though the benefits of an internationally integrated financial system is well argued in the theory of international economics, they are always subject to several other factors such as a developed and transparent market, technological betterment, an efficient payment system, the prevalence of good governance, political stability, and the deepening of financial services, most of which many developing or underdeveloped nations fail to achieve before or even after financial liberalisation. Although conventional wisdom claims that financial liberalisation leads to higher economic growth through financial integration, the risk of speculative and volatile flow of capital cannot be ignored. Some economists like Prasad et al. (2003) and Stiglitz (2004) have argued that financial integration may have some positive impact on the growth of countries, but it definitely increases the systematic risk of being exposed to external shocks.[3] Especially, in the aftermath of the recent US crisis the fruitfulness of interlinkage between banking sector and capital marketis widely debated under the activity of universal banking, executed with the Gramm Leach Bliley Act (1999). Adopting universal banking was expected to bring an interesting change in the operational mode of the banking industry in terms of sharing risk. Although in reality, this new financial architecture has become one of the important factors in spreading systemic risk and a higher linkage across banking sector and the market economy.

In the light of recent US crisis the linkage between banking sector and market economy (till 1999, under Glass Steagall Act of 1933, commercial banks of the US were restricted from engaging themselves into investment banking) has seen a new dimension which raised the basic question related to endogenous instability of the market economy. However, the extent of inter-linkage between banking sector and market based economy differs across countries, especially; it is significantly less in case of developing countries. Nevertheless, the capital market too started playing a significant role to raise long term fund for the developing countries and the coexistence and co-development of the market based economy has become a common phenomenon in developing countries. India is also not an exception. In recent years, the Indian financial system has been gradually maturing with the co-existence of intermediary and market-based systems, thus drawing the benefits of both. The development and integration of the Indian financial system (RBI, 2007) motivate us to reexamine the hypothesis of relative importance and the inter-linkage

---

[2]   One study by Toffler (1991) shows that an estimated 200 billion dollars' worth of foreign exchanges is traded everyday in London, New York, and Tokyo alone. Of this not more than 10% is associated with world trade; the remaining 90% in speculation.

[3]   In an anticipation of an election result in Brazil, it not only turned to IMF for fund but also raised the interest rate to a high just to stop predicted outflow of capital with a much adverse consequence of the macroeconomic shocks.

of banking sector and stock market (as the private bond market is relatively less developed) for the macroeconomic betterment.

The relative merit of bank based or market based system is widely tested in the context of developed and developing (relatively less but) countries (Arestis et al, 2004). The debate on relative merit of finance startedwith the basic argument if finance leads economic growth or growth makes finance to follow (Robinson, 1952). There are some literatures which emphasizes either bank based (Bagehot, 1873; Schumpeter, 1912; Gerschenkron, 1962; Stiglitz, 1985; Bhide 1993; Sing 1997) or market based economy (Levine, 1991; Bencivenga et al., 1995; Boyed et al. 1998) for the growth of the economy. Alternatively, another spectrum of literature (Merton et al. 1995; Caprio, 2001; Demirguc-Kubt et al., 1996; Levine, 1997;) which say that it is neither the bank nor market based economy rather it is the environment in which these financial institutions operate does matter for the growth of the economy.

In the post-liberalisation period, following a comprehensive programme involving issues related to banking, the capital market India has achieved a new growth trajectory. The sustained high growth of the Indian economy in the later phase of liberalisation is often referred to as a success story without major exposure to any of the external financial crises that have occurred. The prudent yet extensive programme of domestic deregulation (involving significant financial reform with limited convertibility of the currency for capital account transactions) that has been followed towards global economic integration has made India's regulatory framework internationally praised. The role of financial capital, mostly in the form of FDI, external equity and debt securities, plays a significant role in the worldwide integration of the financial system (Ghosh and Chandrashekhar, 2009).[4]

However, the linkage of the banking industry and capital market with the real sector economy may prove to be alarming in the event of an international crisis. Though India was not really directly affected by the severity of the recent US crisis, it may be interesting to look into a statistics provided by Mohan (2009) which describes that a few banks invested in the collateralized debt obligations/bonds which had a few underlying entities with sub-prime exposure (out of 77 reported banks, 14 reported having exposures to Lehman Brothers and in related entities either in India or abroad, in which majority of the exposures were not covered by the bankruptcy proceedings). Even though the overnight market became stable in the longer period, these banks suffered some losses owing to the mark-to-market losses[5] caused by the widening of

---

[4]   For instance, foreign investment flows increased by 495.92% between 1995-96 and 2006-07 (from $4.9 billion in 1995-96 to $29.2 billion in 2006-07) and further by 111.64% in 2006-07 and 2007-08 (to $61.8 billion in 2007-08) (RBI, 2009a). It should be noted that net capital inflow was relatively low, $8.2 billion, till 2001-02 in spite of the liberalisation of foreign portfolio investment and ECBs by Indian private sector firms. It began booming only after 2003 and in one year grew by 91.46% (it was $15.7 billion in 2003-04). Besides the boom in the Indian stock market, net external commercial borrowings by Indian firms rose by 71.06% in 2006-07 and 2007-08, mainly for a sharp increase in short-term borrowing. As the interest rate in the international market remained lower than the Indian market, large firms could afford to borrow outside through the syndicated loan route and invest in India. Consequently, the inflow of total stock securities (debt securities, trade credits and loans) rose by 66.67% between 2006 and 2008 (RBI, 2009b).

[5]   Mark-to-Market losses may happen when a security bought and held is valued at current market price which is below the purchasing value. For example, if a company invests in some securities and the market value of these securities falls afterwards, then they assign the new market value to their assets they are exposed to mark-to-market losses on their holding even if they did not sell.

the credit spreads arising on term liquidity in the market. Almost all the banks show increasing borrowing from the call market since June-July, 2008 and at the same time the Liquidity Adjustment Facility (LAF)[6] operation of RBI also increased (Mohan, 2009). Further, it may be noted that deposit insurance in India is very low compared to developed countries (Mohan, 2009).[7]

Given this backdrop, the extent to which this integration (RBI, 2007)of the Indian financial system facilitates the growth of the real sector is an interesting issue. In this paper, we examine three interconnected hypotheses. First, we measure the impact of financial development on real sector growth. Second, the financial structure that has been conducive to the growth of the real sector economy both in the pre and post reform periods. Though it is well known that India is more dependent on the banking sector, in the time of a booming capital market we examine the relative merits of the banking credit channel and capital market finance (as India's bond market is not well developed, we take the equity market as a proxy of the capital market). Third, the long-run relationship of the development of the banking sector and the market economy with the growth of the real sector economy. As the banking sector's exposure to the capital market has been increasing, we also examine the co-integration between these two sectors. If a long-run equilibrium persists, we may say that one sector's development or crisis exposure may have a spillover effect on the other. It is well known that finance matters to the growth of the economy. So we also examine the co-integration of the banking sector and capital market with the real sector economy. If co-integration persists, we may say that a complementary relationship exists between real and financial sector development.

To address these three interconnected hypotheses (discussed in detail in the literature review section), we follow the standard methodology (discussed in Section 3) in Levine (2002), Beck and Levine (2002), and Arestis et al. (2004). The financial development index is formed from these studies, which include both the banking sector and capital market. These studies were the first attempt to examine the hypotheses of bank or market-based economy in the context of developing countries by addressing cross/panel data. A major criticism of Levine (2002) and Beck and Levine (2002) is that they fail to address cross-country heterogeneity. Adopting dynamic heterogeneous panel estimators (six-country panel[8]), Arestis et al. (2004) showed that it is inappropriate to pool data across countries. He was highly critical about the use of panel data and argued that all the existing panel tests (panel unit root, panel co-integration, dynamic heterogeneous or otherwise, and traditional panel test) were misleading, if not adjusted for cross-country heterogeneity, and that panel estimates were not consistent with country-specific

---

[6] Liquidity Adjustment Facility (LAF) was introduced by RBI during June, 2000 in phases, to ensure smooth transition and keeping pace with technological upgradation, with the first revision in March, 2004 and the latest revision in October, 2004. Liquidity adjustment facilities facilitates banks in resolving any short-term cash shortages during periods of economic instability or from any other form of stress caused by forces beyond their control. Various banks will use eligible securities as collateral through a repo agreement and will use the funds to alleviate their short-term requirements, thus remaining stable.

[7] The coverage limit in India is $2,288 (US$ 1 = Rs. 43.7), in the European Union it is $25,823 (US$ 1=Euro 0.7745), and in the US it is $100,000.

[8] Greece, India (1966-1999), South Korea, the Philippines, South Africa and Taiwan.

estimations.[9] By employing both Johansen's multivariate VAR framework and the FMOLS method, he found that financial development mattered for the growth of the economy. This result was in contrast to Levine (2002) and Beck and Levine (2002).

However, testing the hypothesis of a bank or market-based economy in the context of Indian economy may not provide a significant conclusion if the period of study includes only the early liberalization period. It may be because the growth of the Indian stock market was not so significant at the first phase of liberalization. So, analysing this hypothesis for India is very unlikely to show any evidence of the contribution of the market economy, especially because existing studies consider stock market liquidity, size and efficiency as indicators of a market economy. Also, the integration between the banking sector and the capital market is as important as the relative merits of these two systems. This integration between these two financial institutions emerged as an important factor in the aftermath of the recent US crisis.

The second phase of reform in the Indian context has rightly been identified by Barman (2007) as the phase of "true liberalisation". So, we propose to examine the hypothesis to know the relative impact bank lending channel and stock market on per capita GDP growth in India during 1980-2008. Here, we examine the hypothesis that in the early stage of development a country depends more on the banking industry than the market. It may be noted that by saying market-based we do not intend to convey the same extent of dependence on market finance as is commonly prevalent in developed countries. For instance, the majority of the Indian population depends on the banking industry as the only formal source of finance even after the high peak experienced by the Indian stock market recently. Moreover, a large part of the population still remains out of formal credit lending channels, which cannot cater to them at an affordable cost.

While admitting this fact, we found that there are increasing participation of different other sectors in the stock market. For instance, if we take participation of Indian banking sector in terms of investment in the stock market we would see there is an increasing trend prevailing in the capital market (Appendix II, FigureII.1). Also, lending to sensitive sector shows Indian SCBs has been experiencing significant growth in their lending to capital market although it is the real estate sector which holds the maximum share (Appendix II, Figure II.2). Being the largest deposit holding institution as Indian SCBs shows larger participation in the capital market both in terms of lending and investment. This may be the case of different other sectors operative in India. Besides, given that the major players in the Indian stock market are a small set of large firms/corporates, the advantage of stock market development is likely to be confined. This may be a possible reason for the growing and alarming level of inequality in India.

We test the long-run relationship of the development of the banking sector, market economy and the real sector economy by employing the J-J co-integration technique. Examining integration among these financial sectors and real economy variables might show the possibility that one sector follows the other in boom and bust cycles. Also, a well-integrated financial system might act as shock absorber when it operates in an efficient framework, unless it is subjected to systemic risk. On the other hand, the stochastic co-movement between the bank lending channel and market finance may make the banking sector exposed to external shocks in the long run as the market economy is likely to be more sensitive and integrated with the world financial market.

---

[9]   He found that in the VECM, the negative signed large co-efficient (-0.519) of South Africa alone was sufficient to turn the overall co-efficient for the panel into negative (-0.008).

It might prove expensive in terms of social cost for a country like India where a majority of the population still depends on the banking sector primarily as a deposit-holding institution.

The paper unfolds as follows. Section 2 explores the literature on the theory of relative conduciveness of the financial structure for the growth of an economy and the lacunae in the existing literature. Section 3 explains the econometric methodology followed and the database used. Section 4 illustrates the results and Section 5 concludes.

2. Conducive Financial System: Bank or Market-Based Economy

It remains a long-debated issue whether a bank-based or market-based financial structure is more conducive to the growth of the economy. The controversy over the relative merits of financial systems began at the close of the 19th century when German economists claimed that their bank-centered financial system was influential in propelling Germany past the market-centered United Kingdom as an industrial power (Goldsmith, 1969). Later, in the 20th century, this debate expanded with the bank-based Japan on one side and the market-based United States on the other.

Although this issue has been widely tested in developed economies (Allen and Gale, 1999; Stiglitz, 1985), it may be noted that after the implementation of the Glass-Steagall Act in 1933, commercial banks' activities were restricted in the US and other developed countries for a long period of time. So, most of the developed countries were characterised by the dominance of either a bank-based or a market-based financial system. However, the European countries in the mid-1960s and the US in the late 1980s began allowing their commercial banks to operate in the capital market. As a result, financial integration across different financial systems on the domestic and international fronts experienced a momentum. So, we may say that worldwide financial integration across important financial segments has added a different dimension to the debate on the relative merits of bank or market-based economies. A country may be more bank or market dependent but the interconnectedness between these two financial pillars may be a crucial factor in the spillover effect of external shocks, as was widely seen in most of the developed countries in the aftermath of the recent US crisis.

The role of financial development and the relative conduciveness of the banking sector and the stock market for the growth of an economy are long-debated issues. In the literature, the causal relationship between financial development and real sector growth is also debated. A section of the literature, since Bagehot (1873) and Schumpeter (1912), stands for the buoyant influence of financial services (historically, the banking sector). They argue that development of the financial sector helps in efficient allocation of resources and aids in minimising the problems of moral hazard, adverse selection and transaction costs and thereby contributes to growth. A school led by Robinson (1952) has argued in favour of the opposite causal direction, which says "where enterprise leads, finance follows" (p. 82). Alternatively, there are studies which show a two-way causal relationship. The empirical work by Goldsmith (1969), taking 35 countries for 1860-1963, showed that a parallel relation between economic and financial growth can be found if it is tested for long period of time. Another study by King and Levine (1993a) showed that the long-run level of growth, capital formation and productivity is well predicted by financial intermediation. Further a cross-country, firm-level study by Demirguc-Kunt et al. (1996) showed

that firms with an external source of funding experience a higher level of growth than what could have been achieved with an internal source of finance. They found that firms' growth is positively related to the stock market turnover and the status of enforcement of law. Though the direction of causality is debated, we may say that there is a general consensus that a well-developed financial sector matters to the balanced growth of the real sector economy. Several financial crises like the South East Asian crisis, Latin American crisis and the US crisis have proved the underpinning significance of a well-executed financial system for the effective functioning of the real sector economy.

The controversy regarding the conduciveness of the financial structure has two dimensions. First, whether it does matter at all, and second, which financial system is more effectual for the growth of the economy. Levine and Zervos (1996) examined the effect of the stock market and the banking sector on the growth of the economy. They found a robust correlation between stock market liquidity and growth, while it was not robust between stock market size and growth. On the other hand, they found that the banks' lending to the private sector had a strong independent effect on growth. The debate concerning the relative importance of the financial structure began with studies observing that the US and the UK were market-based systems and Japan and Germany were bank-based systems (Hosi et al., 1991; Arestis et al., 2001). These studies concluded that financial systems did matter and confirmed the distinction between market and bank-based systems. However, we have already mentioned that these studies on financial structure and growth have tended to focus on a few industrialised countries and the historical focus has been on Germany, Japan, the UK and the US. Nevertheless the comparison does not hold for the period 1864-1914 as no significant difference is found in the growth rates of these countries. Hence, the conclusions on the distinctive role of banks and markets in the growth of the economy based on these sample countries became suspect (Levine, 2002; Arestis et al., 2004).

The literature on financial structure and economic growth may be discussed on the basis of three contending theories—the bank-based theory that lays emphasis on the positive role of banks; the market-based theory that accentuates the importance of a well-functioning market; and the financial service view that argues that it is not the structure but the overall financial services that matter for the growth of the economy. Historically, the bank-based financial system has been the focus. Bagehot (1873) and Schumpeter (1912) argued that banks were the most efficient institutions in identifying and funding more productive investment and that they spurred more innovative growth. It is well argued that banks play a more effective role in financing development and it is more important for developing countries as it helps in strategic allocation of savings (Gerschenkron, 1962).[10] Stiglitz (1985) and Singh (1997) opined the banking sector was a better organised institution in addressing the agency problem and overcoming the many shortcomings of a market-based system. Moreover, as it operates in the long run, it can effectively monitor and play an important role in corporate governance (Bhide, 1993).

Several studies illustrate the contribution of market-based economies to the growth of real sector economies. Levine (1991) and Bencivenga et al. (1995) saw stock market liquidity as one of the driving factors for financing the needs of the real sector in the long run. The international integration of capital markets and external sources of funds help in implementing

---

[10]   For a detailed analysis, see Levine (2002); Beck and Levine (2002).

higher-return projects, which ultimately boost productivity. In the context of the integration of stock markets across borders, Devereux et al. (1994) and Obstfeld (1994) concluded that it facilitates risk sharing in a more effective manner by diversifying portfolios internationally. However, it is argued that higher returns and better risk sharing in an internationally integrated stock market might lead to a fall in the saving rates and impede the growth of an economy. There are several other studies that acknowledge the contribution of both the banking industry and capital market. By using data on 49 countries over the period 1976-1993, Levine and Zervos (1996) found that both stock market liquidity and banking development positively forecast growth, capital accumulation and productivity improvement when economic and political factors are controlled. However, it is understandable that the financial services provided by the stock market are different from that provided by banks. Their findings contradicted the findings of DeLong et al. (1989), which claimed that stock return volatility encumbers investment and resource allocation. They also did not find any evidence that a more liquid and internationally integrated capital market affects growth and private saving rates negatively. In a related study, Boyd et al. (1996) showed that the financial structure of a country changes as it goes through different stages of development and becomes more market dependent with advancement. In this context, a study by Beck and Kunt (2009) showed that the persistence of a low interest rate in a market-based economy increases the possibility of an overleveraged and fragile financial system. They showed that with a decrease in net interest margins,[11] banks had started turning to other income sources. As a result of increasing participation and high liquidity, the profitability of capital markets, especially returns on equity, increased after 2000.

Some other studies argue in favour of the overall improvement of the financial system. For example, Levine's (2002) study on 48 countries for 1980-95 did not observe any evidence of either the bank-based or the market-based system doing better, but the overall development of financial services played an important role in economic growth. Merton et al. (1995) and Levine (1997) argued in favour of the status of financial services. That is, it is not the source of finance but the overall financial environment within which these two institutions operate that matters. However, following an empirical study, Caprio (2001) concluded that an improved status of both banking and the capital market helped overall economic development. In the age of universal banking, the banking sector and the capital market have become two well-connected entities. They also affect some of the major macro-economic channels important for the effective functioning of the real sector economy.[12] Examining 44 industrial and developing countries for the period 1986-1993, Demirguc-Kunt et al. (1996) found no significant distinction between market and bank-based financial systems. Rather they showed that countries having more developed (weak) markets had highly developed (weak) banking sytems as well. Adopting an endogenous growth model a study by Chakraborty and Ray, (2006) showed that neither a bank-based nor a market-based system is specifically better for growth and it is quite possible for two types of systems in two different countries to deliver similar growth rates of per capita GDP.However, they

---

[11]   Accounting value of a bank's net interest revenue as a share of its interest-bearing (total earning) assets.

[12]   Here we do not discuss the special case of financial service view, namely law and finance. For details, see La Porta et al. 1998; Levine, 1999.

found that through better wealth disribution system and greater participation in manufacturing sector bank based system ensures better per capita GDP than the market based system.

Using both time series and dynamic heterogeneous panels for six developing countries, including India, Arestis et al. (2004) argued that all the sample countries, except the Philippines, signified the importance of financial structure to explain growth although the magnitude differed from one country to another. This study used adjustement dynamics for possible heterogeneity in parameters across countries. It argued that in the presence of macroeconomic heterogeneity, pooling data across countries sometimes gave the wrong result and it might be different from the result of country-sepcific study. It therefore criticised the earlier study of Levine (2002) that pooled data across countries. Arestis et al. (2004) concluded India was bank based during the period 1966-1999. They used Johansen's multivariate VAR framework to examine the co-integration test and the FMOLS method to examine whether a country was bank or market based.

Our study, therefore, is an attempt to investigate the changing structure of the pre and post-liberalised Indian financial system for the period of 1980-2008. We empirically examine the impact of the overall growth of the financial sector on real sector growth and also test whether any co-integration exists between the banking sector and the stock market to understand how far one sector follows the other. In addition, we analyse if real sector variables like per capita GDP and per capita gross capital formation show any long-run equilibrium with the development of the Indian financial system.

3. Database and Econometric Method

We extensively use the revised version of the database (2010) originated by Beck, Demirguc-Kunt and Levine (1999).[13] This database was first published in 1999 to help in region-specific analytical work. It provides country-specific annual data for the period 1960-2008 (varies across countries depending on the indicator). However, our study faces the problem of non-availability of data for a long period of time. Also, as the database is annual, we could not opt for high frequency data. We restrict our analysis to 29 years annual data point (1980-2008) for addressing the state of art.[14] Our study considers only the stock market as an indicator of capital market development since the Indian bond market is still underdeveloped. Like previous studies (Levine et al., 1998; Levine, 2002; Beck, 2009) we use the unweighted average of all three indicators—size (stock market capitalisation/GDP), efficiency (turnover ratio) and liquidity (value traded/GDP)—as an indicator of a market-based system. These indicators show a significantly positive trend for size, liquidity and the efficiency of the Indian stock market (Figure 1). However, the index of financial development[15] used in this study includes both bank lending and stock market development (see methodology for details).[16]

---

[13] It mainly includes the database of the RBI, the IFC's emerging market database (World Bank), the IFS and WDI databases and BankScope.

[14] Arestis et al. (2004) argued that 30 years provides a sufficient length of time for doing a time series analysis. One of the important issues in quantitative economics that remains unresolved is the relative importance of the length of the time period and the frequency of the database.

[15] In general, the index of the overall structure of financial development includes all banks and non-bank financial institutions, while the study of bank-based versus market-based structure does not include non-bank financial institutions. For example, the standard way of calculating the overall size of financial development is to take the ratio of (domestic stock market capitalisation/GDP) to (private credit of
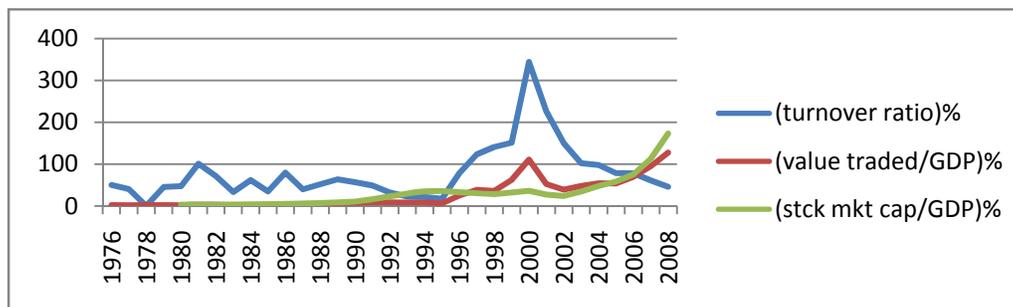
Source: Compiled from the World Bank database.

Figure 1. Indian Equity Market: Turnover Ratio (1976-2008), Value Traded/GDP (1976-2008) and Stock Market Capitalisation (1980-2008)

         To estimate the pre and post-liberalisation effect of financial development on the real sector economy, we divide the period into two—1980-1992 and 1993-2008.[17] Since financial reforms in India took place in a phased manner after 1991, it is likely that there are many small break points. Plotting the series of per capita GDP shows a clear break point in 1993. So we take 1993 as the break point in our analysis.[18] We divide the period of examination into two to make the pre and post-liberalisation analysis feasible. Since we have only 29 years of data point, an individual period's time span becomes less than required for a time series analysis. To solve this problem, we use dummy variables for these periods. Both the intercept and differtial dummy variables are used to examine the additive and multiplicative role of banks and the capital market individually and when they are interconnected. Here, the significance of the co-efficient implies the financial structure does matter for the growth of the economy and the sign of the co-efficient helps us to conclude whether India is a market-based or bank-based economy.

---

         deposit money bank and other financial institutions/GDP). But when we compare bank and market, we take the ratio of (domestic stock market capitalisation/GDP) to (private credit of deposit money bank/GDP). In the database of the World Bank, for India, the data of private credit of deposit money bank and other financial institutions/GDP and the data of private credit of deposit money bank/GDPshows correlation almost one. Hence, we use the bank credit data as the overall financial development data.

[16] Because of the unavailability of data on net interest margin for the period 1980-1991, we use the average of stock market size and liquidity till 1991. After that, it is the average of all three—size, liquidity and efficiency.

[17] Though India began financial reforms in 1991, Barman (2007) argued there were two distinct phases of reforms. In the initial phase, 1991-98, the Indian financial sector experienced a paradigm shift from a regulated regime to a market-determined era through gradual structural adjustment. The second phase from 1999 was termed as "true liberalisation" because both banks and the capital market started enjoying more freedom in it. This is the period India when adopted the policy of universal banking, which has helped Indian banking to operate in a more market-oriented manner.

[18] The statistical test of the structural break on the endogenous variable, per capita GDP, shows two significant break points in 1990 and 2000. Considering these two break points, we do not report the result of using two multiplicative dummy variables, since it does not provide any significant result.

The functional relation is expressed as follows:[19]

$$y_t = \alpha_1 + \beta_1 k_t + \beta_2 f_t + u_t \qquad \ldots (1)$$

$$y_t = \alpha_1 + \alpha_2 D_2 + \beta_1 k_t + \beta_2 f_t + \beta_3 (D_2 k_t) + \beta_4 (D_2 f_t) + u_t \qquad \ldots (2)$$

y_t = log (per capital GDP)

f_t = log (overall financial development)

Overall financial development = average ((market capitalisation/GDP)/(bank lending/GDP) + (value traded/GDP)/(bank lending/GDP) + (turnover ratio/net interest margin))

k_t = log (per capita gross capital formation) where K is real gross capital formation.

D_2 = 1 for the period 1993-2008,

   = 0 otherwise.

Null Hypothesis Ho: $\beta_2 = 0$

Alternative hypothesis $H_1 : \beta_2 \neq 0$.

If we reject null hypothesis, then financial development (f_t) will have some significant impact on the real sector growth. Note that though this is a two tail test, the positive or negative co-efficient does not explain the positive or negative effect on the real sector economy, rather it describes the relative importance of the banking sector and the capital market. If $\beta_2 > 0$ (or $\beta_2 < 0$) we conclude India is a market-based (bank-based) economy. Similarly, if $(\beta_2 + \beta_4) > 0$ ((or $\beta_2 + \beta_4) < 0$), it indicates India is market-based (bank-based) in the liberalisation period.

We report the test summary to confirm whether this regression satisfies all the assumptions of the OLS method. We also use a single equation residual based co-integration or the Engel-Granger test (1987) as the final test of model adequacy. After estimating the regression co-efficient, we test the stationarity of the residual to verify our co-efficient results. The estimated residual series represents the estimated values of the deviations from the long-run relationship. If these deviations are found to be stationary, then the dependent and independent series are co-integrated of order (1,1).

The rationale of the co-integration test is to find a long-run equilibrium among a group of non-stationary series. To examine the long-run relationship of a multi-equation system, the J-J test of co-integration is a more developed method than the Granger (1981) and Engle-Granger (1987) tests used in a single-equation framework. We examine co-integration of a non-stationary series if they are integrated of the same order.[20] To examine non-stationarity, we perform the

---

[19]   It is to be noted that the financial variables used in the model are inflation adjusted. As it is likely that many macro variables (inflation, trade channel) are driving factors in the growth of the economy, we have tested our model with some of the factors like gross exports and imports and inflation. But the results are not reported as all the independent variables are insignificant. We have reported a few tables on our test which include call money rate (as cost of credit channel) and export of goods and services (trade channel) in the Appendix III, Table III.1. Also, dynamic integration result (hardly shows significant result) are reported (AppendixIII, Table III.2). Result of dynamic regression is also available, but not reported for the same reason.

[20]   Persistence of the unit root leads to the non-stationarity problem of an economic time series. In other words, if the characteristics of a stochastic process (mean, variance, autocovariance) change over time, then the series is non-stationary. If these characteristics are constant over time, the series is stationary.

Augmented Dickey Fuller (ADF) test (1979),[21] a modified version of the DF test.[22] In the ADF test, the null hypothesis is the presence of unit root or the level variables are non-stationary. It constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR(p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression.

$$\Delta y_t = a_0 + \gamma y_{t-1} + \sum_{i=2}^{p} \beta_i \, \Delta y_{t-i+1} + \varepsilon_t \qquad \qquad \text{... (3)}$$

where $\gamma = -\left(1 - \sum_{i=1}^{p} a_i\right)$

$$\beta_i = -\sum_{j=1}^{p} a_j$$

The null and alternative hypotheses may be written as H_0: $\gamma = 0$ or the presence of unit root. The Engel-Granger test says if two non-stationary series y_t and x_t are integrated of the same order, say, of order one, and if their linear combination is stationary, then it can be said that they are co-integrated. It implies that the regression of these two variables $y_t = \beta x_t + u_t$ is not spurious and in the long run, these two variables move together.

We use the Johansen Juselius (J-J) test (1993) as the residual-based single-equation co-integration method is not able to provide the number of co-integrating vectors in the case of more than one co-integrating vector. The J-J test is a system method in the VAR framework that considers all the variables as endogenous. As a result, it helps us avoid arbitrary choice of the endogenous variable in the model specification.

The VECM representation can be expressed in the following form (Enders, 2008)

$$\Delta X_t = \Pi \, X_{t-1} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \, \Delta X_{t-2} + \dots + \Gamma_p \, \Delta X_{t-p} + \varepsilon_t \qquad \qquad \text{... (4)}$$

If all the variables be I(1) then there is necessarily a linear combination of the I(1) variables that is stationary. The J-J test is focused on estimating the long-run matrix (Π), as in long-run equilibrium all the short-run value (ΔX_{t-i}) will be zero. For multiple co-integrating vectors, we have $1 < \text{rank}(\Pi) < n$.

The J-J test of co-integration has two test statistics—the trace test and the maximum Eigenvalue test.

$$\lambda_{trace} (r) = - T \sum_{i=r+1}^{n} \ln (1 - \hat{\lambda}_i)$$

For the trace test, the null hypothesis test the existence of less than or equal to r co-integrating vectors against a general alternative.

$$\lambda_{max}(r, r+1) = -T \ln (1 - \hat{\lambda}_{r+1})$$

For the Eigenvalue test, the null hypothesis is the existence of utmost r co-integrating vectors against the alternative of r+1 co-integrating vectors.

---

[21]   The ADF test involves three functional forms of simple autoregression, with and without constant or time trends in testing for the unit root. Graphic analyses of our data series show most of the variables have a clear trend and some do not have any discernible trend. To generalise the results, we apply all the three functional forms to all the data sets.

[22]   For more details, see Dickey and Fuller, 1979; 1981.

Where $\widehat{\lambda_i}$ = the estimated values of the characteristic roots (also called Eigenvalues) obtained from estimated Π matrix.

T = the number of usable observation.

In our analysis, the J-J test is employed for both macroeconomic (PGDP, PCF) and financial variables (BNK, MKT) to examine the co-integration across financial sectors and the real economy and financial sectors.

4. Empirical Results

We begin by estimating regression coefficients. The growth of overall financial development shows a positive and significant influence on per capita GDP growth for the period 1980-2008, though it is not robust.

From Appendix II, Table II.1 we can see that 100% change of overall financial development leads to 1.2% growth in per capita GDP. On the other hand, a 100% change in per capita gross capital formation leads to 64% growth of per capita GDP. Though the regression is run on non-stationary variables (Appendix II, Table II.2, stationary at first difference), the Engel-Granger test of stationarity of the estimated residual series (Appendix II, Table II.3) concludes that the regression is not spurious (Granger and Newbold, 1974).[23] The result of co-integration validates the existence of a long-run relationship among the macro and financial indicators (Appendix II, Table II.4).

Next, we examine the pre and post-liberalisation effect of the financial sector on the growth of per capita GDP. Unlike the earlier study by Arestis et al. (2004), which concluded India was a bank-based economy during the period 1966-1999, we find an increasing contribution of market finance. With a negative and significant β_2 (= -2%), we may conclude India was a bank-based economy in the pre-liberalisation period, but market-based in the post-liberalisation period, indicated by the positive and significant slope coefficient $\beta_2+\beta_4$ (= 3.516%). The insignificant intercept dummy (Appendix II, Table II.5) indicates that there is no significant difference in the autonomous part between the pre and post-liberalisation periods. On the other hand, the insignificant co-efficient of per capita capital formation in the post-liberalisation period indicates no significant difference in the effect of per capita gross capital formation on per capita GDP growth during the pre and post-liberalisation periods. The test summary again concludes that our analysis follow all the assumptions of the OLS method.

Next, by using the ADF test we find that all the four variables—PGDP, PCF, BNK, MKT— are non-stationary at their level but stationary at the first difference (Appendix II, Table II.6). So, we conclude that these variables are integrated of order one or I(1). We report the co-integration VECM results in Appendix II, Table II.7 and Table II.8 respectively.

From Appendix II, TableII.7, we see that both the bank lending channel and market channel shows co-integration with per capita GDP and per capita Capital formation (reporting with the Type I error at 1% level). Also, the co-integration between the bank lending channel is highly significant (at 1% level) with the market channel. It signifies advancement or a crisis in either Bank lending channel and market channel are likely to have a spillover effect from one sector to the other although short run adjustment factor shows (Appendix II, Table, II.8) significant

---

[23]   The test summary also shows that all the assumptions of classical OLS are satisfied.

adjustment is expected through bank lending channel. It may also be claimed that both the bank lending channel and market channel show significant long run equilibrium with macroeconomic development of India. On the other hand, from Appendix II, Table, II.9 we find that India's macroeconomic factor (here PGDP and PCF) is having significant influence on the betterment of both the banking sector and the market economy. On the contrary, we fail to see any significant impact of financial development (both the bank lending channel and market economy) on the growth of per capita GDP and per capita capital formation. However, bank lending channel shows significant complementary relationship with market channel. This not only signifies the success of one of the reform policy agendas to increase the participation of the banking industry to the capital market but it also emphasizes that there is both way dependency between the bank lending channel and the market economy.

5. Conclusion

In this paper, we empirically tested the effect of financial liberalisation on the growth of the real sector economy. It is well known that the banking sector and the stock market are two most influential financial institutions that channelise resources for the growth of the real sector economy. As a majority of the population depends on the bank lending channel, it has had a significant role in the growth of the economy. However, in the recent period, there has also been an unprecedented boom in the stock market, which plays a complementary role in channelising resources. At the same time, the capital market has been criticised for spreading external shock to the domestic economy.

Against this backdrop, we empirically examined if bank lending channel and the market channel have any significant interlinkage with the per capita GDP and per capita capital formation. We also estimated the relative effect of the banking sector and the capital market on the growth of India's real sector economy in the pre and post-liberalisation periods. This study addressed the issue of the increasing inter-linkage between the banking sector and the stock market and the integration of each of these sectors with the growth of the real sector economy.

Other than employing a classical regression analysis, we used Johansen and Juselius' advanced econometric technique for the co-integration of error correction vectors. Our analysis for the period 1980-2008 concludes that financial sector development does matter for the real sector economy to grow. The analysis of the pre and post-liberalisation periods shows that the Indian economy remained bank-based in the pre-liberalisation period, while the stock market began emerging as an alternative source of finance in the post-liberalisation period. It also supports the conventional theory that in the early stages of economic development, the banking industry fosters economic growth to a greater degree than a market-based financial system.

Our co-integration test shows strong evidence of a long-run relationship between the private credit lending channel and stock market development, supported by the short-run adjustment parameter. This indicates the possibility that credit lending of the Indian banking sector and stock market development are likely to follow each other positively in times of boom and bust. The relationship between the banking channel and the market economy may imply the benefit of diversification in the long run. Conversely, since stock market movement is more sensitive to external shocks, in the event of a crisis, it may prove to be costlier for the growth of

the real sector economy. So, any sudden collapse in the stock market (which is more prone to downturns in the international financial system) may lead to a slowdown in the credit lending of the banking sector in the long run.

Although integration is evident between the real sector and the financial system as well, we see that the macroeconomic development leads to the growth of both the bank lending channel and market channel, while no significant flow is found from financial sector to the macroeconomy. This supports the famous view of Joan Robinson (1952) – "where enterprise leads finance follows". However, we find significant dependency between bank lending channel and market economy. Hence, we may conclude that this dependency and the integration across these two major sources of finance will be beneficial for the Indian economy in terms of diversification of risk and the availability of finance. But as the capital market is more prone to external shocks, it may have some negative impact on the growth of the overall economy.

It may be noted that the majority of the Indian population depends on the banking industry as the only formal financial institution to meet their financial needs at an affordable cost. However, the long-run relationship between the financial and real sectors implies the possible transmission of finance for the growth of the real sector economy. Conversely, if external shocks or crises have a severe impact on stock market performance, which is more likely phenomenon in an internationally integrated market, it may have an impact on the bank lending channel and the growth of the Indian economy may have adverse impact because of the shortage in the availability of finance.

Reference

Allen, F. & Gale, D. (1999), *Comparing Financial Systems*, MIT Press, Cambridge.

Arestis, P., Demetriades, P. and Luintel, K., (2001), "Financial Development and Economic Growth: The Role of Stock Markets", *Journal of Money, Credit, and Banking*, 33(1), pp. 16-41

Arestis, Philip, Ambika D. Luintel and Kul B. Luintel (2004), "Does Financial Structure Matter?" The Levy Economics Institute Working Paper, No. 399.

Bagehot, Walter (1873), *Lombard Street: A Description of the Money Market*, London: Henry S. King and Co.

Barman, R. B. (2007), "Determinants of Profitability of Banka in India", presidential address delivered at 43rd Annual Conference of the Indian Econometric Society, Indian Institute of Technology, Bombay (5th January).

Beck Thorsten and AsliDemirguc-Kunt (2009), "Financial Institutions and Market across Countries and over Time - Data and Analysis", Third Version, available on 02/01/2010 at http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/Financial_Institutions_and_Markets_across_Countries.pdf

Beck Thorsten and AsliDemirguc-Kunt, Rose Levine (1999), "A New Database on Financial Development and Structure", Policy Research Working Paper, No. 2146, World-Bank.

Beck, T. and Levine R., (2002), "Stock Markets, Banks and Growth: Panel Evidence", *NBER Working Paper Series No. 9082*, Cambridge, Mass.: National Bureau of Economic Research.

Bencivenga, Valerie R.; Smith, Bruce D. and Starr, Ross M (1995)**,** "Transactions Costs, Technological Choice, and Endogenous Growth", *Journal of Economic Theory,* October, *57* (1) , pp. 53- 177.

Bhide, A. (1993), "The Hidden Costs of Stock Market Liquidity", *Journal of Financial Economics* 34(1): 1-51.

Boyd, John H. and Smith, Bruce D. (1996), "The Co-evolution of the Real and Financial Sectors in the Growth Process", *The World Bank Economic Review*, May, 10(2), pp. 371-396.

Caprio, Gerard and Honohan Patrick (2001), "Finance for Growth: Policy Choices in a Volatile World", A Policy Research Report, World Bank.

Chakraborty, S and TridibRay (2006), "Bank versus Market Based Financial Systems: a Growth Theoretic Analysis", *Journal of Monetary Economics*, 53, pg 329-350.

De Long, J. Bradford, Shleifer, Andrei, Summers, Lawrence H. and Waldmann, Robert J. (1989), "The Size and Incidence of the Losses from Noise Trading," *Journal of Finance*, July, 44 (3), pp. 681-96.

Demirguc-Kunt, Asli and Maksimovic, Vojislav (1996), "Financial Constraints, Uses of Funds and Firm Growth: An International Comparison", Policy Research Working Paper, No. 1671, World Bank.

Devereux, Michael B., and Smith, Gregor (1994), W. "International Risk Sharing and Economic Growth", *International Economic Review*, August, 35(4), pp. 535-50.

Dickey, D. A. and W. A. Fuller (1979), "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, Vol. 74, pp. 427-431.

Dickey, D. A. & Fuller, W. A. (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", *Econometrica,* Vol. 49, pp. 1057-1072.

Engle, R. F. & Granger, C. W .J. (1987), "Cointegration and Error Correction: Representation, Estimation and Testing", *Econometrica*, 55 (2), pp. 251-276.

Enders, Walter (2008), *Applied Econometric Time Series*, UK, John Wliley& Sons, Inc.

Granger, C. W. (1981), "Some Properties of Time Series Data and Their Use in Econometric Model Specification", *Journal of Econometrics* 16: 121-130

Ghosh, Jayati and C. P. Chandrasekhar (2009), "The Cost of 'Coupling': the Global Crisis and the Indian Economy", *Cambridge Journal of Economics*, 33, pp. 725-739.

Goldsmith, Raymond (1969), *W. Financial Structure and Development*, New Haven, CT: Yale University Press.

Granger, C.W.J. and P. Newbold, (1974), "Spurious Regression in Econometrics", *Journal of Econometrics*, Vol. 2, pp.111-120

Hoshi, T., Kashyap, A., Scharfstein, D., (1991), "Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups" *Quarterly Journal of Economics*, Vol. 106, pp. 33-60.

Johansen, S. (1988), "Statistical Analysis of Cointegrating Vectors", *Journal of Economic Dynamics and Control* 12: 231-254.

Johansen, S. and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference on Cointegration – with Application to the Demand for Money", *Oxford Bulletin of Economics and Statistics,* Vol. 52, pp. 169-210.

King, Robert G. and Levine, Ross (1993a), "Finance and Growth: Schumpeter Might Be Right", *Quarterly Journal of Economics*, August, 108(3), pp. 717-38.

King, Robert G. and Levine, Ross (1993b), "Finance, Entrepreneurship, and Growth: Theory and Evidence", *Journal of Monetary Economics*, December, 32(3), pp. 513-42.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. W. (1998), "Law and Finance", *Journal of Political Economy* 106(6): 1113-1155.

Levine, R. (1997), "Financial Development and Economic Growth: Views and Agenda", *Journal of Economic Literature* 35: 688-726.

Levine, R. (1999), "Law, Finance, and Economic Growth", *Journal of Financial Intermediation,* 8 (1-2): 8-35.

Levine, R., (2002), "Bank-based or Market-based Financial Systems: Which is Better?", J*ournal of Financial Intermediation,* 11(4), pp. 398-428.

Levine, Ross (1991), "Stock Markets, Growth, and Tax Policy", *Journal of Finance*, September, 46(4), pp. 1445-65.

Levine, Ross and Zervos, Sara (1996), "Stock Markets, Banks and Economic Growth", *American Economic Review*, Vol. 88, pp. 537-558.

Merton, R. C. and Bodie, Z. (1995), "A Conceptual Framework for Analysing the Financial Environment", In D.B. Crane et al (eds.), *The Global Financial System: A Functional Perspective.* Boston, Mass.: Harvard Business School.

Mohan, Rakesh (2009), *Monetary Policy in a Globalized Economy: a Practitioner's Review*, Oxford University Press, New Delhi.

Obstfeld, Maurice **(**1994), "Risk-Taking, Global Diversification,and Growth", *American Economic Review,* December, 84 (5), pp.1310-29.

Prasad, E. Kenneth Rogoff, Shang-Jin Wei and M. AyhanKose (2003), "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence", Occasional Paper, *International Monetary Fund.*

Rajan, Raghuram G. and Zingales, Luigi (1998), "Financial Dependence and Growth", *American Economic Review*, June 1998, 88, pp. 559-86.

RBI (2007), Financial Market Integration, *Report on Currency and Finance*, Chapter VIII, Reserve Bank of India

Reserve Bank of India (2009a), "Foreign Investment Flows, Reserve Bank of India", March, available at http://rbidocs.rbi.org.in/rdocs/Bulletin/DOCs/T46_TradeBal.xls

Reserve Bank of India (2009b), "International Investment Position (IIP) of India as at the end of September 2008", Reserve Bank of India, 19 March, available at http://rbidocs.rbi.org.in/rbiadmin/scripts/BS_PressReleaseDisplay.aspx?prid520357.

Robinson, Joan (1952), "The Generalization of the General Theory," in *The Rate of Interest and Other Essays*, London: Macmillan.

Schumpeter, Joseph A (1912), *Theorie der WirtschaftlichenEntwicklung.* Leipzig: Dunker &Humblot,. *The Theory of Economic Development*, 1912, translated by Redvers Opie. Cambridge, MA: Harvard University Press, 1934.]

Singh, A. (1997), "Stock Markets, Financial Liberalisation and Economic Development", *Economic Journal* 107: 771-782.

Stiglitz, J. E. (1985), "Credit Markets and the Control of Capital", *Journal of Money, Credit, and Banking* 17 (1): 133-152.

Stiglitz, J. E. (2004), "Capital-Market Liberalization, Globalization and the IMF", *Oxford Review of Economic Policy*, Vol. 20, No.1.

Toffler, Alvin (1991), *Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century*, Bantam.

Appendix I

Before the early 1990s, the Indian financial system was mostly characterised as fragmented and underdeveloped, with pricing controls, entry barriers, transaction restrictions, high transaction costs and low liquidity. A series of reforms since the early 1991 has aimed to develop the various segments of the financial market by phasing out the administered pricing system, removing barrier restrictions, introducing new instruments, establishing an institutional framework, upgrading the technological infrastructure, and evolving efficient, safe and more transparent market practices. The country's financial reforms, especially banking sector reforms, are well discussed in the financial literature and also documented in different reports and publications of the RBI. Instead of re-documenting the same, we intend to discuss only a few of the major reforms relevant to our study.

Reforms in Indian banking industry

One of the important reforms faced by the Indian banking industry is the deregulation of interest rates. The process of deregulation of deposit interest rates began in the 1980s. In April 1985, banks were allowed to set interest rates for maturities between 15 days and up to one year, subject to a ceiling of 8%. The process of deregulation of interest rates, which resumed in 1992, was largely completed by October 1997 when deposit rates were fully deregulated by removing the linkage to the bank rate. The few categories of interest rates that continued to be regulated on the lending side were small loans up to Rs. 2 lakh and rupee export credit, and on the deposit side, the savings bank deposit interest rate. The rates on small loans up to Rs. 2 lakh and rupee export credit were deregulated in July 2010, when the RBI replaced the benchmark prime lending rate (BPLR) system with the base rate system. With this, all rupee lending rates were deregulated. On the deposit side, the only interest rate that continued to be regulated until October 2011 was the savings deposit interest rate.

More leeway was given to a few non-bank entities, especially to non-banking finance companies (NBFCs), in their lending operations. Besides borrowing from wholesale sources and capital markets, they could also participate in the interbank market or clearing. They were therefore largely insulated from commercial banking. It was after financial sector reforms that their entry was permitted to project and other long-term financing.

Another major policy change has been the introduction of additional instruments in the money market. The introduction of certificates of deposit, commercial papers, and collateralized borrowing and lending obligations (CBLOs) were the first step towards enhancement of commercial banks' advances to marketable instruments so as to diversify corporate borrowers' short-term borrowings and enable them to raise a part of their requirement at a competitive price from the market. The CBLO provides avenues for non-bank institutes to deal with their short-term liquidity mismatches. For more effective open market operation and greater liquidity to retail investors, the ad-hoc treasury bill (TB) was abolished in 1997 and regular auction was introduced. The LAF was introduced in 2000 for smooth functioning of the market repo, a key equilibrating factor between the money and securities markets. It helps the RBI to set the repo and reserve repo rate to reduce volatility and manage liquidity more efficiently.

To improve participation and liquidity in all the segments of financial markets, banks were allowed increased access to the call/notice money market, in domestic and overseas money

market instruments and/or debt instruments, subject to limits approved by their board of directors. It helped to enhance the integration between domestic and overseas money and capital markets (2003). The largest public sector bank, State Bank of India (SBI), entered the capital market with an equity-cum-bond issue in 1993-94.

The major and most important policy to encourage the participation of foreign investors was opening up the stock market to FIIs. In 1992, they were allowed to invest in government dated securities if they were registered with the Security Exchange Board of India (SEBI), and in 1998, they were allowed to invest in TBs. Authorised dealers (ADs) were also permitted to borrow and/or invest up to US$10 million (this amount was later relaxed gradually) from/in their overseas offices and correspondences without any conditions on end use and repayment of such borrowings. ADs were advised not to arbitrage between the money and foreign exchange markets and provide forward exchange cover to FIIs for their investment in debt instruments (1997) and the overseas money market. In the next section, we explore in greater detail some of the major policy reforms that helped the development of the security market in India.

Security market reforms

The major reforms in the Indian capital market since the 1990s are presented below.

In 1992, the Capital Issues (Control) Act (1947) was phased out, enabling the corporate sector to raise capital from markets without the permission of regulators, subject to sufficient disclosures in the offer documents. A book-building mechanism for the pricing of new capital issues was introduced in 1995, whereby the offer price of an initial public offering is based on the demand for the issue. The SEBI issued buy back of securities regulations in 1998, under which a company is permitted to buy back its shares from shareholders. To control excess volatility in the markets, circuit breakers have been introduced on the stock exchanges. Effective since June 2, 2001, index-based market-wide circuit breakers applicable on the BSE Sensex and the S&P CNX Nifty (the two major indexes of stock prices) are operational at 10%, 15% and 20% movement on either side of any of the indices. On the other side, FIIs have been allowed to invest in Indian equities since 1992. These deregulations helped bring about more participation in the Indian equity market, and thereby generated huge liquidity in the market.

To activate the corporate debt market in India, a number of policy initiatives were taken during the 1990s. The interest rate ceiling on corporate debentures was abolished in 1991, paving the way for market-based pricing of corporate debt issues. To improve the quality of debt issues, rating was made mandatory for all publicly issued debt instruments, irrespective of their maturity. On the other hand, all privately placed debt issues are required to be listed on the stock exchanges and follow disclosure requirements. However, despite policy initiatives, corporate debt still constitutes a small segment of the debt market in India. Secondary market activity in the debt segment, in general, remains subdued at both the BSE and the wholesale debt market (WDM) segment of the NSE, partly because of a lack of sufficient number of securities and partly because of a lack of interest by retail investors. To improve secondary market activity in this segment, the Union Budget for 1999-2000 abolished the stamp duty on the transfer of dematerialised debt instruments.

Major stock exchanges have set up settlement guarantee funds (SGFs) to provide the necessary funds, which are like self-insurance schemes with the members contributing to the funds. SGFs also ensure timely completion of settlement in cases of member brokers' failure to fulfil their settlement obligations, especially during periods of market turbulence. Further, the clearing houses set up by each of the stock exchanges have substantially reduced counterparty risk in the settlement system. Various risk management mechanisms, such as capital adequacy requirements, trading and exposure limits, and daily margins composed of mark-to-market margins and value at risk margins, are now in place.

Introduction to the online electronic trading system has improved efficiency in the price discovery mechanism, lowered transaction costs, promoted transparency in transactions, and helped improve integration across stock exchanges throughout the country. A system of delivery versus payment (DvP) was introduced in the transaction of government securities from July 1995. To introduce more transparency, depth and liquidity to the money and capital markets, more power has been given to the SEBI for expanding the process of dematerialisation of securities along with adopting an electronic fund transfer and settlement system (1998). The reduction in the settlement risk in securities transactions has strengthened the government securities market as well as provided guidelines and procedures for the enlistment of primary dealers. Shorter settlement cycles reduce the risk involved in transactions and speculative activity, and infuse more liquidity into the markets. Indian stock markets, which previously followed a Monday-to-Friday settlement cycle, gradually switched to a rolling settlement cycle. The rolling settlement cycle was reduced to T+3 effective from April 2002 and further to T+2 effective from April 2003 in line with the best international practices.

Appendix II

Investment by Indian SCBs in Capital Market

Figure II.1.

Growth of Lending to Sensitive Sector by SCBs

	2003	2004	2005	2006	2007	2008	2009
■ capital market	-18.8	49.4	265.8	40.6	37.4	75.6	-10.3
■ real estate	38.3	27.1	820.71	80	41.5	90.6	-45.4
■ commodities	2.9	22.5	-74.69	-40.3	56.1	27.2	11.6
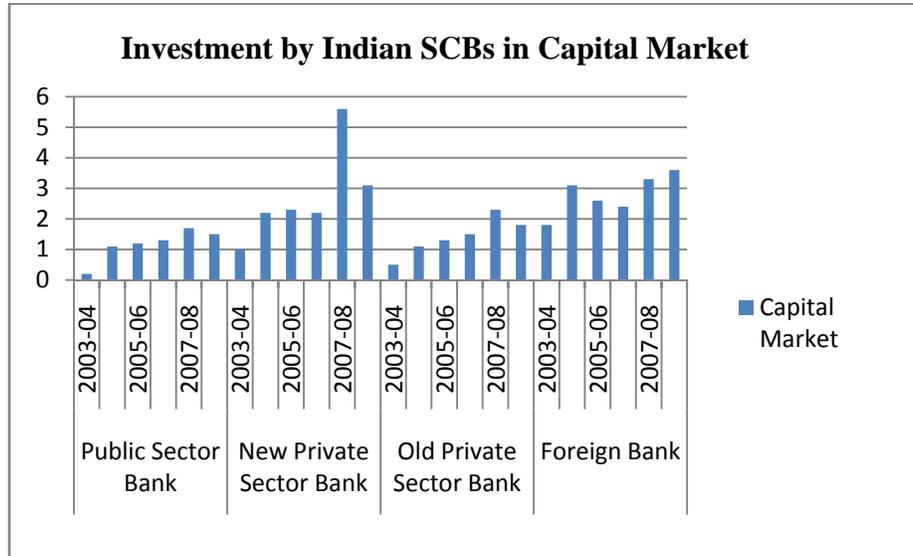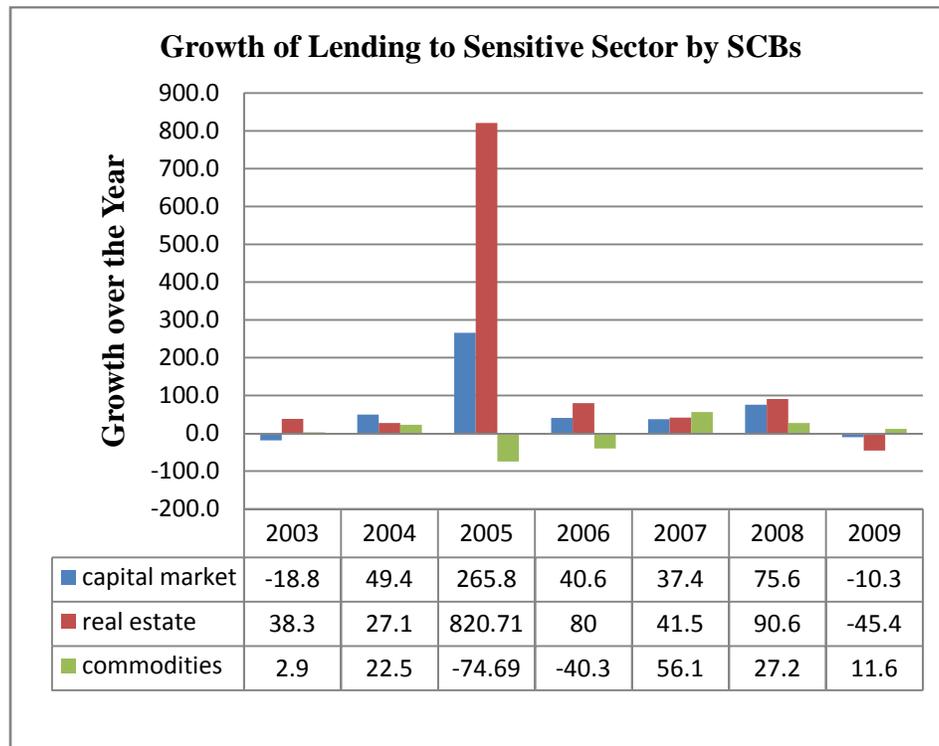
Figure II.2.

Table II.1. Result of OLS: Dependent Variable - Per Capita GDP (1980-2008)

	Co-efficient	Std. Error	t-value	t-prob	Part.R^2
Constant	3.02741	0.08354	36.2	0.000	0.9806
K	0.645032	0.01836	35.1	0.000	0.9794
F	0.0122542	0.005081	2.41	0.023	0.1828

Test Summary

AR 1-2 test: $F(2,24)$ = 0.35204 [0.7068]

ARCH 1-1 test: $F(1,24)$ = 0.62183 [0.4381]

Normality test: $Chi^2(2)$ = 4.1417 [0.1261]

Hetero test: $F(4,21)$ = 1.8101 [0.1646]

Hetero-X test: $F(5,20)$ = 1.3791 [0.2740]

RESET test: $F(1,25)$ = 0.13282 [0.7186]

Table II.2. Unit Root Test for 1980-2008: Variables: y, k, f

	D-lag	t-adf	beta Y_1	Sigma	AIC	F-prob
Dy	0	-3.709*	0.087308	0.08725	-4.746	0.6587
Dk	0	-4.529**	-0.11320	0.1436	-3.751	0.3041
Df	0	-4.772**	-0.073002	0.5596	-1.030	0.4300

Note: The reported results are with the minimum value of AIC. Though we are able to reject the presence of unit root with higher lag, the result is not reported as it is not associated with the minimum value of AIC.

Table II.3. Reporting the Stationarity of the Residual – Engel-Granger Test

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
6	-1.640	-0.25213	0.04594	-0.5783	0.5737	-5.863	
5	-2.293	-0.47412	0.04475	0.4995	0.6258	-5.931	0.5737
4	-2.398	-0.32292	0.04353	0.5840	0.5685	-6.007	0.7565
3	-2.468	-0.16837	0.04257	1.041	0.3143	- 6.078	0.8301
2	-2.242	0.076510	0.04268	-0.1574	0.8769	-6.104	0.7693
1	-2.949	0.038937	0.04143	-0.1421	0.8886	-6.198	0.8623
0	-4.463*	0.0059894	0.04029			-6.292	0.9210

Note: ADF tests (T=21, Constant+Trend; 5%=-3.65 1%=-4.47)

Table II.4. JJ Co-integration Test: y, k, f

	Null Hypothesis	Trace test		Max test	
	H_0	Alternative	Statistics[Prob]	Alternative	Statistics[Prob]
y, k, f	r=0	r>1	30.04 [0.047]*	r=1	26.50 [0.006]**
	r<=1	r>2	3.53 [0.930]	r=2	3.41 [0.906]
	r<=2	r=3	0.12 [0.729]	r=3	0.12 [0.729]

Table II.5. Result of OLS: Dependent Variable Per Capita GDP (D2 = 1993-2008)

	Co-efficient	Std. Error	t-value	t-prob	Part.R^2
Constant	2.91275	0.2552	11.4	0.000	0.8500
D2	0.108963	0.2672	0.41	0.687	0.0072
k	0.658408	0.05919	11.1	0.000	0.8433
f	-0.0245740	0.01076	-2.28	0.032	0.1849
D2k	-0.0220283	0.06124	-0.36	0.722	0.0056
D2f	0.0597447	0.01548	3.86	0.001	0.3930

Test Summary

AR 1-2 test: $F(2,21)$ =1.7174 [0.2038]

ARCH 1-1 test: $F(1,21)$ = 0.27235 [0.6072]

Normality test: $Chi^2(2)$ = 0.52540 [0.7690]

Hetero test: $F(9,13)$ = 0.79494 [0.6275]

Hetero-X test: not enough observations

RESET test: $F(1,22)$ = 2.2085 [0.1514]

Table II.6. Unit Root Test for 1980-2008: PGDP, PCAF, BNK, MKT

	D-lag	t-adf	beta Y_1	Sigma	AIC	F-prob
DPGDP	0	-4.339*	-0.13454	51.82	8.022	0.7770
DPCF	0	-4.269*	-0.071981	24.19	6.498	0.4688
DBNK	0	-4.429*	0.093597	0.009999	-9.084	0.3523
DMKT	0	-4.782**	-0.099111	0.2669	-2.515	0.6856

T=22, Constant+Trend; 5%=-3.63 1%=-4.44

Table II.7. Co-efficient Values of JJ: PGDP, PCF, BNK, MKT – Two Variable Combinations

Country	Null Hypothesis H_0	Trace test		Max test	
		Alternative	Statistics[Prob]	Alternative	Statistics[Prob]
PGDP, BNK	r=0 r<=1	r>1 r=2	35.90 [0.000]** 1.61 [0.239]	r=1 r=2	34.29 [0.000]** 1.61 [0.239]
PGDP, MKT	r=0 r<=1	r>1 r=2	19.11 [0.003]** 4.55 [0.037]*	r=1 r=2	14.56 [0.011]* 4.55 [0.039]*
BNK, MKT	r=0 r<=1	r>1 r=2	26.80 [0.000]** 3.32 [0.080]	r=1 r=2	23.48 [0.000]** 3.32 [0.081]
PCF, MKT	r=0 r<=1	r>1 r=2	22.12 [0.001]** 3.75 [0.061]	r=1 r=2	18.36 [0.002]** 3.75 [0.063]
PCF, BNK	r=0 r<=1	r>1 r=2	36.59 [0.000]** 0.61 [0.501]	r=1 r=2	35.98 [0.000]** 0.61 [0.494]
PGDP, PCF	r=0 r<=1	r>1 r=2	14.88 [0.017]* 0.56 [0.520]	r=1 r=2	14.32 [0.012]* 0.56 [0.513]

Table II.8. Result of VECM

Error Correction:	D(BNK)	D(PGDP)
CointEq1	-0.007709	-18.25565
SE	(0.00321)	(14.7825)
t-stat	[-2.40371]	[-1.23495]
Error Correction:	D(MKT)	D(PGDP)
CointEq1	-0.004744	6.441512
SE	(0.01259)	(2.72727)
t-stat	[-0.37685]	[2.36189]
Error Correction:	D(MKT)	D(BNK)
CointEq1	0.82628	0.016773
SE	(0.11648)	(0.00517)
t-stat	[0.70940]	[3.24509]
Error Correction:	D(MKT)	D(PCF)
CointEq1	0.004708	-10.27648
SE	(0.03887)	(3.88386)
t-stat	[0.12110]	[-2.64595]
Error Correction:	D(BNK)	D(PCF)
CointEq1	-0.019938	-49.44201
SE	(0.01239)	(27.1833)
t-stat	[-1.60875]	[-1.81884]
Error Correction:	D(PCF)	D(PGDP)
CointEq1	0.392047	0.844481
SE	(0.14697)	(0.31569)
t-stat	[2.66759]	[2.67502]

Table II.9. Regression Coefficient of JJ Cointegration (1981 to 2008)

	Co-efficient	Std. Error	t-value	t-prob
URF equation for PGDP				
PGDP_1	1.10849	0.09152	12.1	0.000
BNK_1	-65.8240	159.4	-0.413	0.683
URF equation for BNK				
PGDP_1	9.57506e-005	1.980e-005	4.84	0.000
BNK_1	0.881370	0.03449	25.6	0.000
URF equation for PGDP				
PGDP_1	1.07869	0.04053	26.6	0.000
MKT_1	-6.54508	32.62	-0.201	0.843
URF equation for MKT				
PGDP_1	0.00049701	0.0001753	2.84	0.009
MKT_1	0.639593	0.141	4.54	0.000
URF equation for BNK				
BNK_1	1.1038	0.01754	57.6	0.000
MKT_1	0.0185	0.008101	2.28	0.031
URF equation for MKT				
BNK_1	0.546884	0.3011	1.82	0.081
MKT_1	0.774897	0.1391	5.57	0.000
URF equation for PCF				
PCF_1	1.13974	0.05376	21.2	0.000
MKT_1	-4.19527	13.04	-0.322	0.750
URF equation for MKT				

PCF_1	0.00139838	0.0005083	2.75	0.011
MKT_1	0.708139	0.1233	5.74	0.000
URF equation for PCF				
PCF_1	1.14829	0.07449	15.4	0.000
BNK_1	-13.1300	39.12	-0.336	0.740
URF equation for BNK				
PCF_1	0.000170965	3.452e-005	4.95	0.000
BNK_1	0.962193	0.01813	53.1	0.000
URF equation for PGDP				
PGDP_1	0.994134	0.08922	11.1	0.000
PCF_1	0.263347	0.2959	0.890	0.382
URF equation for PCF				
PGDP_1	-0.0160384	0.04164	-0.385	0.703
PCF_1	1.17736	0.1381	8.52	0.000

Appendix III

Table III.1. Regression Analysis K (per capita capital formation), F (financial development as a ratio of bank and market), CR (call rate), E (export of goods and services)

	Coefficient	Std.Error	t-value	t-prob
Constant	3.03782	0.2379	12.8	0.000
K	0.647566	0.05602	11.6	0.000
F	0.0121916	0.005244	2.32	0.029
CR	-0.00260424	0.002300	-1.13	0.269
E	1.14589e-005	0.0004824	0.0238	0.981

Table III.2. Dynamic Regression Analysis

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
PerCapGDP_1	0.0562657	0.1767	0.318	0.753	0.0046
Constant	2.82832	0.5419	5.22	0.000	0.5532
PerCapK	0.507640	0.05951	8.53	0.000	0.7678
PerCapK_1	0.110053	0.1130	0.974	0.341	0.0413
MKT/BNK	-0.0241008	0.01475	-1.63	0.116	0.1083
MKT/BNK_1	0.0379103	0.01494	2.54	0.019	0.2264

Table III.3. Test for Structural Break in 2001

mkt	Coef	Std. Err.	t	P>|t|	[95% Conf. Interval]	
t	.0352679	.0091152	3.87	0.001	.0165313	.0540044
dt2001	-.0030381	.0066544	-0.46	0.652	-.0167164	.0106403
_cons	-.0186194	.1142814	-0.16	0.872	-.2535281	.2162893

Table III.4. Test for Structural Break in 2000

mkt	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
t	.0183919	.009261	1.99	0.058	-.0006445	.0374282
Dt2000	.0119581	.0066481	1.80	0.084	-.0017073	.0256234
_cons	.1203712	.1106768	1.09	0.287	-.1071282	.3478706

Table III.5. Structural Break (endogenously determined) and Unit Root Test

UR Test with structural break for series: MKT
used break date: 2000
shift function: shift dummy
time trend included
critical values (Lanne et al. 2002):

T	1%	5%	10%
1000	-3.55	-3.03	-2.76

Regression Result

variable	coefficient	t-statistic
d(trend)	0.0084	0.0507
d(const)	0.0726	2.3467
d(shiftfkt)	1.0006	32.3566
dx(-1)	0.4647	2.5121
dx(-2)	-0.0874	-0.4725

◆◆◆