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FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN INDIA : AN ANALYSIS OF THE POST-REFORM PERIOD

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Financial Development and Economic Growth in India:
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Abstract :

This paper examines the impact of the developments in the financial sector on economic growth in India in the post-reform period. The paper extends the models of Pagano (1993) and Murinde (1996) to formalize the relationship between financial development and economic growth in the structure of an endogenous growth model. The model is then estimated using quarterly data for the period 1993 to 2005 for India. The results show that investment-output ratio has a positive significant effect on real rate of growth of GDP, irrespective of the indicator of stock market development. An increase in market capitalization dampens economic growth but an increase in the money market rate of interest has a positive significant effect. Real wealth and interest rate differentials have negative significant effect and the lagged values of foreign exchange reserves appear to have a marginally significant negative effect on economic growth. The findings lend little support to the theoretical prediction that the development of stock market would play an important role in enhancing economic growth in India. Instead, the banking system reform appears to have promoted economic growth significantly. These results support the view that in India stock markets are no substitutes for the banking sector, unlike in some emerging economies like Chile and Mexico.

JEL Classification: F43, G21, O16

Key words: financial development, economic growth, banking sector, stock market

I. Introduction

Since the beginning of the 1990's, the Indian economy has been undergoing economic reforms which include financial sector reforms among others. Financial sector reforms mainly entailed reforms of the banking system and the capital market. With deregulation of the interest rate Indian banking system has become more market-oriented since 1991. There has been a rapid expansion of the stock market activities as well. The number of stock exchanges increased from 9 in 1981 to 22 in 1991. The number of listed companies increased from 2265 in 1980 to 6229 in 1991, and market capitalization increased from 68 billion rupees in 1980 to 1103 billion rupees in 1991 and to 11926 billion rupees in 2000. What effect do these developments in the financial sector have on economic growth in India?

Since the influential works of Goldsmith (1969), McKinnon (1973) and Shaw (1973), there has been a long debate on the role of financial intermediaries in promoting long-run growth. In the 1990s a set of theoretical papers contributed to this debate, which include Greenwood and Jovanovic (1990), Bencivenga and Smith (1991, 1993), Obstfeld (1994) and Saint-Paul (1992). Theoretical models throw up conflicting inferences about whether stock markets and banks act as substitutes or complements of each other (see for instance, Boyd and Prescott (1986) and Stiglitz (1985)). Theoretical models have triggered empirical research exploring the relationships between banks, stock markets and economic growth. King and Levine (1993a, b) show that bank development helps explain economic growth in a sample of 80 countries. Similar ovservations have been made by Levine (1998, 1999), Beck, Levine and Loayza (2000), and Levine, Loayza and Beck (2000). These studies, however, fail to draw any inference on whether this positive relationship between banks and economic growth holds even after controlling for stock market development. Levine and Zervos (1998), however, is an exception. They find that stock market liquidity and bank development are both strong predictors of economic growth in

a sample of 47 countries. Beck and Levine (2004) confirm this finding but improve upon Levine and Zervos (1998) by (i) using moving average data averaged over five years, (ii) by controlling for many other growth determinants, and (iiii) using the generalized-method-of-moments technique for a dynamic panel covering 40 countries. Arestis, Demetriades and Luintel (2001) also examine the relationship between stock market development and economic growth while controlling for the effect of the banks and stock market volatility applying the time-series method on 5 developed economies. They confirm Levine and Zervos's finding for three countries only. For the other two countries their finding suggests that the effect of bank-based financial system to promote long-term growth is more powerful than that of stock markets[1].

The purpose of this paper is to further explore the relationship between financial development and economic growth in the specific context of India, recognizing the separate roles that the banking system and the stock market have played in India in the post-reform period. We begin with an analytical framework to analyse the relationship between financial development and economic growth in India in the structure of an endogenous growth model. The theoretical model is then tested empirically considering quarterly data from India for the period from 1993.2 to 2005.2.

The rest of the paper is organized as follows. Section 2 presents an overview of the financial sector reform in India. Section 3 introduces the analytical framework. Section 4 deals with the methodological issues and the data used in the empirical analysis. Section 5 presents the empirical results. Section 6 summarizes the results of the analysis and concludes.

[1] For a comprehensive review of empirical literature on financial development and economic growth see Chakraborty (2008).

II. Financial Sector Reforms in India: An Overview

Financial sector reforms in India were introduced as a part of the economic reform programme initiated in 1991. The principal objective of financial sector reforms was to improve allocative efficiency of resources, ensure financial stability and maintain confidence in the financial system by enhancing its soundness and efficiency (Gopinath, 2007). In August 1991 the Indian government appointed the Narasimham Committee to look into all aspects of the financial system and make comprehensive recommendations for reforms. The Committee, submitted its report in November 1991, recommended various reform measures for the banking sector and the capital market. The government broadly accepted the recommendations without delay and the process of reform was set in motion. We shall discuss briefly the major reforms introduced in the banking sector and the capital market in India since then.

Following the recommendations of the Narasimham Committee, the interest rate was liberalized in 1991. Interest rates on time deposits were deregulated gradually. With effect from October 1997 interest rates on all time deposits, including fifteen days deposits, have been freed. However, the rate on savings deposits remained controlled by the Reserve Bank of India. Lending rates were also decontrolled. The Reserve Bank of India now controls only the interest rate charged on export credit, which accounts for only 10 percent of commercial advances (Ahluwalia, 1999).

Since the reform of 1991, some liberalization measures have been taken on the cash reserve ratio (CRR) and statutory liquidity ratio (SLR). Before 1991, the CRR was as high as 25 percent and the SLR was 40 percent. The CRR has come down to 6 percent in 2006-07 and the SLR is 25 percent at present.

The area in which the recommendation of the Narasimham Committee has not been followed relates to directed credit programmes. Under the directed credit programmmes the

commercial banks are required to direct 40 percent of their commercial advances to the priority sector which consists of agriculture, small-scale industries, small-scale transport operators, artisans etc. Within this aggregate ceiling there are sub-ceilings for agriculture and also for loans to poverty-related target groups. The major shortcoming of the directed credit programme is that the proportion of non-performing assets (NPA) in the priority sector portfolio of the banks is much higher than in the non-priority sector (Ahluwalia, 1999).

Another important feature of the reforms is that, since 1991, a number of foreign banks and private entrepreneurs are invited to commence banking operation in India. To enhance competition, foreign direct investment up to 74 percent of ownership has been allowed in private banks and up to 20 percent in nationalized banks. In addition, the limit for foreign institutional investment in private banks is fixed at 49 percent. The numbers of foreign and private banks operating in India have increased from 21 and 23 in 1991 to 33 and 30 in 2004, respectively. In the liberalized regime, government equity in banks has been reduced and strong banks have been allowed to access the capital market for raising additional capital.

Any discussion on reforms in the Indian banking system will remain incomplete without mentioning the regulatory reform introduced since 1991. Before 1991, Indian banking system did not allow uniform accounting practices for income recognition, classification of assets into performing and non-performing, provisioning for non-performing assets and valuation of securities held in the bank's portfolio. Following the recommendations of the Narasimham Committee, uniform prudential norm was established in the lines of Basel Committee on Banking Supervision from March 1996. Very few banks had a capital adequacy ratio up to 8 percent level before 1991. By March 1998 only one of the 28 public sector banks fell short of this standard (Ahluwalia, 1999). In order to reach the stipulated capital adequacy norms substantial capital was provided by the

Government to public sector banks. There were efforts to reduce NPAs too. Prior to 1991, the ratio of net NPAs to total advances was 16.3 percent and it came down to 8.2 percent by the end of 1997-98.

Capital market reform was an integral part of the agenda of financial sector reforms in India. The oldest stock exchange in India – the Bombay Stock Exchange (BSE) – started its operation in 1875. However, the volume of activity in BSE was limited till 1980. It started expanding rapidly since 1980. But before 1992, the functioning of the Indian capital market remained highly regulated and was under the direct control of the government. In 1992, Securities and Exchange Board of India (SEBI) was formed as the apex regulator of the capital market. The new regulatory framework laid down by SEBI sought to strengthen investor protection by ensuring disclosure and transparency rather than through direct control. The requirement of prior government permission for accessing capital markets and prior approval of issue pricing was abolished since 1992.

In 1993, the Indian capital market was opened up to foreign institutional investors (FIIs) and Indian companies were allowed to raise capital abroad by issue of equity in the form of global depository receipts (GDRs). By 1999, over 500 FIIs were registered with SEBI and by this time the cumulative investment of $15 billion took place through the routes of FIIs and GDRs (Ahluwalia, 1999).

Another major reform measure in the Indian capital market was the set up of the National Stock exchange (NSE) in 1994 with nationwide stock trading and electronic display and clearing and settlement facilities. Due to the competitive pressure from the NSE, the BSE also introduced electronic trading in 1995. Finally, a major change in relation to the secondary market was that the settlement period was reduced to one week. At the same time carry forward trading was banned and then reintroduced in restricted form and moves were made towards a rolling settlement system.

III. Analytical Framework

This section is heavily drawn on Pagano (1993) and Murinde (1996). We assume that the population is stationary and the economy produces a single good that can be invested or consumed.

Following Pagano (1993), we begin with the simple endogenous growth model:

$$Y_t = AK_t \quad \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

where Y_t = aggregate output or income, A = social marginal productivity of capital and K_t = aggregate capital stock. This model reasonably captures output growth in India in the post-reform period as it has been observed that industrial growth has increased without any increase in employment growth which signifies that intensity of capital has increased in the post-reform period (Bagchi, Das and Chattopadhyay, 2005 and Das, 2007)[2].

Gross investment is of the following form:

$$I_t = K_{t+1} - (1-\delta)\, K_t \quad \ldots\ldots\ldots(2)$$

where I_t = gross investment and δ = the rate at which capital depreciates per period.

In an open economy like India, equilibrium condition requires that savings-investment gap is identically equal to the sum total of budget deficit and trade deficit. It is assumed that the budget is balanced. Hence, in equilibrium, savings-investment gap is equal to trade deficit.

Thus, $S_t - I_t = X_t - M_t = - K_{ft}$ .....(3)

where S_t = gross domestic savings in period t, X_t = exports in period t, M_t = imports in period t and K_{ft} = net inflows of capital.

[2] In a recent model on endogenous growth, Bhaduri (2006) has also shown that the long-run steady-state growth rate of output need not be constrained by an exogenous growth rate of labour supply; instead endogenous technological change enabled by capital played the role to increase growth of investment and output.

Assuming that some leakage (1-θ) out of the flow of domestic savings takes place during the process of financial intermediation, we can write

$$\theta S_t + K_{ft} = I_t \quad \ldots\ldots\ldots\ldots\ldots\ldots(4)$$

From (1) we get, $g_{t+1} = (Y_{t+1}/ Y_t) - 1 = (K_{t+1}/K_t) - 1$ where g_{t+1} = growth rate at time t+1.

From (2) we get, $g_{t+1} = A(I_t/ Y_t) - \delta$.

Using equation (4) we derive that

$$g_{t+1} = A\theta s + A(K_{ft}/ Y_t) - \delta \quad \ldots..(5)$$

where $s = S_t / Y_t$.

Equation (5) suggests that at steady state, the growth rate depends on social marginal productivity of capital, the proportion of total savings that are transformed into investment, savings ratio and the ratio of net inflows of capital to aggregate output or income.

Dropping the time-indices, we get from equation (5):

$$g = A\theta s + A\varphi - \delta \quad \ldots\ldots\ldots\ldots(6)$$

where $\varphi = K_{ft}/Y_t$.

We now consider the behavioural nature of each element in equation (6).

Following Murinde (1996), it is assumed that the behaviour of A is a function of capital-output ratio and we have

$A = f(K/Y)$ .....(7)

In India, activities of government securities market are thin (Sen and Vaidya, 1999). Thus, unlike Murinde (1996), we assume that è is influenced by the stock market development and not by the bond market. It is reasonable to assume that the behaviour of θ depends on either of the two indicators of stock market development, viz., market capitalization (MCAP) and turnover (TURN). It may be noted that the market capitalization ratio is generally taken as a measure of stock market size and turnover measures stock market liquidity. It is discussed in Buffie

(1986) that a real devaluation increases the real cost of imported goods in an economy highly dependent on imported capital goods and hence reduces private investment. Thus we further assume that θ depends on real effective exchange rate (REER). In a study by Greene and Villanueva (1991) on 23 developing countries it was found that high inflation rate had a negative effect on private investment. Thus, inflation (INFL) also becomes an influential variable to explain the behaviour of θ. Furthermore, Oshikoya (1994), argues that adverse movement in terms of trade has adverse consequences on private investment through worsening of the ratio of current account deficit to GDP. The presence of large volume of external debt burden has the implication that funds available for investment will be reduced due to the commitment to service the debt. Following these latter arguments è is assumed to be further influenced by terms of trade (TOT) and external debt burden (DEBT). The behaviour of θ can therefore be expressed as follows :

$$\theta = f(STOCK, REER, INFL, TOT, DEBT) \quad \ldots\ldots\ldots\ldots\ldots(8)$$

where STOCK= stock market development indicator .

Following Murinde (1996), behaviour of savings ratio (s) is assumed to be influenced by the rate of return in the money market or market rate of interest (INT). Savings ratio in India is also likely to depend on the rate of return in the informal credit market. However, it is difficult to get a measure of the rate of return in the informal credit market. It is discussed in Athukorala and Sen (2004) that private saving in India is further influenced by inflation (INFL), real wealth (WEALTH) proxied by the ratio of money stock (M3) to gross national domestic income and terms of trade (TOT). Hence the behaviour of s in India may be expressed as:

$$s = f(INT, INFL, WEALTH, TOT) \quad \ldots\ldots\ldots\ldots\ldots\ldots(9)$$

Finally, in an analytical framework developed by Chakraborty (2006) analyzing the behaviour of net capital inflows in India in the post-reform period, it is shown that the influential

variables are real effective exchange rate (REER), interest rate differential between domestic rate of interest and world rate of interest (INTDIFF), inflation (INFL), current account balance (CAB) and foreign exchange reserve (FOREX). Based on this study we assume that the ratio of net inflows of capital to aggregate output, ö, can be represented by the following equation:

$$\varphi = f(REER, INTDIFF, INFL, CAB, FOREX) \quad \ldots\ldots\ldots\ldots(10)$$

For the sake of simplicity, we assume that g, the rate of growth of output, is linearly related to each of the variables in the above specifications. Substituting the functions (7) – (10) into (6) we derive the following reduced form :

$$g = \alpha_0 + \alpha_1(K/Y) + \alpha_2 STOCK + \alpha_3\ INT + \alpha_4\ REER + \alpha_5 DEBT + \alpha_6\ TOT + \alpha_7 INFL + \alpha_8\ WEALTH + \alpha_9\ INTDIFF + \alpha_{10}\ CAB + \alpha_{11}\ FOREX + v \quad \ldots\ldots\ldots\ldots\ldots\ldots(11)$$

where v = white noise error term and STOCK can be either MCAP or TURN.

Equation (11) shows how banking system development and stock market development could affect growth after controlling for the effects of a large number of macroeconomic variables.

IV. Data and Methodological Issues

The empirical analysis is carried out using quarterly data for India for the period 1993.II to 2005.II. The data series have been directly obtained or compiled from Handbook of Statistics on Indian Economy, 2005-06 (Reserve Bank of India), Reserve Bank of India Bulletin (various issues) and International Financial Statistics (International Monetary Fund, various issues).

The rate of growth of GDP (g) is measured as the rate of growth of gross domestic product at factor cost at 1993-94 prices (RGDP). The series on GDP is reported quarterly for the period from 1996.III to 2005.I by the Reserve Bank of India (2005—06). We have estimated RGDP from this series for the period 1996.III to 2005.I. The same source reports the annual

data for GDP. We applied an interpolation method to transform the annual series into quarterly series for period from 1993.II to 1996.II and for 2005.II. For this purpose we have used the quarterly series for index of industrial production (IIP) and assumed that the quarterly movement in GDP is similar to the quarterly movement in IIP[3].

Following Murinde (1996), capital-output ratio (K/Y) is proxied by investment- output ratio (INV) since this data is readily available. Using linear interpolation method we have estimated quarterly investment-output ratio from annual investment-output ratio figures estimated from Reserve Bank of India (2005-06).

It is already stated that stock market development (STOCK) is measured by either market capitalization (MCAP) or turnover (TURN). Both the series are for the Bombay Stock Exchange and expressed as the percentage of GDP.

Money market interest rate (INT) is measured as quarterly bank rate in India. External debt burden (DEBT) is measured as lagged ratio of external debt to exports ratio and represented as the variable DEBTLAG while estimating equation (11). The variable terms of trade (TOT) could not be included in empirical estimation because this series is reported annually and estimation of quarterly data seems not to be meaningful. Inflation is measured as quarterly change in Wholesale Price Index. For estimating interest rate differentials (INTDIFF), as world rate of interest, we have considered three-months U.S. Treasury Bill rate reported by International Monetary Fund.

V. Empirical Results

In section II we have outlined various hypotheses on the factors due to financial development, which are believed to affect economic growth. In this section, we examine empirically to what extent these factors explain economic growth in the present liberalized regime in India. We have estimated several variants of equation (11) by including and excluding the fundamentals affecting ö, the ratio of net inflows of capital to aggregate output. The specifications used in subsequent estimation are as follows :

$$RGDP = \alpha_0 + \alpha_1 INV + \alpha_2 STOCK + \alpha_3 INT + \alpha_4 REER + \alpha_5 DEBTLAG + \alpha_6 WEALTH + \alpha_7 INTDIFF + v \quad \text{.....(12)}$$

$$RGDP = \alpha_0 + \alpha_1 INV + \alpha_2 STOCK + \alpha_3 INT + \alpha_4 REER + \alpha_5 DEBTLAG + \alpha_6 WEALTH + \alpha_7 INTDIFF + \alpha_8 INFL + \alpha_9 INFL1 + \alpha_{10} CAB + \alpha_{11} CAB1 + \alpha_{12} FOREX + \alpha_{13} FOREX1 + v \quad \text{.....(13)}$$

$$RGDP = \alpha_0 + \alpha_1 INV + \alpha_2 STOCK + \alpha_3 INT + \alpha_4 REER + \alpha_5 DEBTLAG + \alpha_6 WEALTH + \alpha_7 INTDIFF + \alpha_8 DINFL + \alpha_9 DINFL1 + \alpha_{10} DCAB + \alpha_{11} DCAB1 + \alpha_{12} DFOREX + \alpha_{13} DFOREX1 + v \quad \text{.....(14)}$$

$$RGDP = \alpha_0 + \alpha_1 INV + \alpha_2 STOCK + \alpha_3 INT + \alpha_4 REER + \alpha_5 DEBTLAG + \alpha_6 WEALTH + \alpha_7 INTDIFF + \alpha_8 INFL1 + \alpha_9 CAB1 + \alpha_{10} FOREX1 + v \quad \text{.....(15)}$$

In these equations CAB1 = lagged value of CAB, DCAB = first difference of CAB, and DCAB1 = lagged value of first difference of CAB. Similar interpretations hold good for INFL1, DINFL, DINFL1, FOREX1, DFOREX, and DFOREX1.

Before estimation we have tested for stationarity of all the variables. Unit root tests have been applied to test stationarity of these variables. Table 1 reports the results of unit root tests.

[3] For application of similar interpolation method, see Granville and Mallick (2003).

Table 1. Test Results for Unit Roots

Variables	DF test	ADF test	Phillips-Perron test
RGDP	-7.88*(with C)	-0.18 (without C and T , 8 lags)	-22.63 * (with C)
INV	-4.43 (wth C and T)	8.51 (without C and T , 1 lag)	-4.42 * (with C and T)
MCAP	2.73 (without C and T)	1.48 (without C and T, 4 lags)	2.52 (without C and T)
TURN	-1.44 (without C and T)	-0.71 (without C and T, 5 lags)	-1.003 (without C and T)
INT	-2.67 (with C and T)	-1.70 (without C and T, 8 lags)	-2.53 (with C and T)
REERX	1.33 (without C and T)	0.82 (without C and T, 13 lags)	1.47 (without C and T)
REERT	1.48(without C and T)	0.82 (without C and T, 13 lags)	1.67 (without C and T)
DEBTLAG	-8.25*(with C and T)	-2.50(with C and T, 14 lags)	-12.39* (with C and T)
INFL	-10.80* (with C)	1.34 (with C and T, 14 lags)	-12.79*(with C and T)
WEALTH	-4.28*(with C and T)	0.26 (without C & T, 6 lags)	-3.97 (with C and T)
INTDIFF	-1.92 (without C and T)	-1.99 (with C, 11 lags)	-1.90 (without C and T)
CAB	-3.59* (without C and T)	-0.92 (without C and T, 15 lags)	-3.56* (without C and T)
FOREX	-2.15 (without C and T)	3.58 (without C and T, 15 lags)	-1.69 (without C and T)
DRGDP	-8.60* (without C and T)	-5.45* (without C and T, 7 lags)	-31.68* (without C and T)
DINV	-9.20* (with C)	-6.18* (with C, 2 lags)	-9.72* (with C)
DMCAP	-5.13 * (without C and T)	-3.22* (without C and T, 2 lags)	-5.09* (without C and T)
DTURN	-9.69 * (without C and T)	-7.41 * (without C and T, 1 lag)	-10.69* (without C and T)
DINT	-10.51* (with C)	-5.03 * (without C and T, 1 lag)	-9.43 * (without C and T)
DREERX	-6.74* (without C and T)	-3.86 * (without C and T, 2 lags)	-6.73* (without C and T)
DREERT	-6.89* (without C and T)	-3.72* (without C and T, 2 lags)	-6.89* (without C and T)
DDEBTLAG	-9.96* (without C and T)	-4.79 * (without C and T, 5 lags)	-30.41* (without C and T)
DINFL	-13.76* (without C and T)	-8.73* (without C and T, 2 lags)	-25.36* (without C and T)
DWEALTH	-7.02* (without C and T)	-11.89* (without C and T, 1 lag)	-8.96* (without C and T)
DINTDIFF	-7.72* (with C)	-3.72 * (without C and T, 1 lag)	-7.48* (without C and T)
DCAB	-7.53* (without C and T)	-6.18 * (without C and T, 2 lags)	-7.92 * (without C and T)
DFOREX	-11.66* (without C and T)	-5.55* (without C and T, 5 lags)	-14.68* (without C and T)

*Note: * implies significant at 1% level*

The null hypothesis of a unit root at the level of the variables is accepted in all the variables using Augmented Dickey-Fuller (ADF) test. It thus establishes nonstationarity of the variables at the levels. However, in cases of some variables, viz. RGDP, DEBTLAG, WEALTH and CAB, Dickey-Fuller (DF) test and Phillips-Perron test results at the level of the variables differ from that of the ADF test. Results of the DF test and Phillips-Perron test are, however, in conformity with that of the ADF tests on the first differences of the variables. Thus it appears that, the null hypotheses of unit root in the first difference of the variables are rejected in all the cases. This implies that the series are integrated of order one or I (1).

If two or more non-stationary series are cointegrated then OLS estimates at the level of the variables are consistent (Mukherjee, White and Wyuts, 1998). Before running the OLS regression we therefore tested for cointegration between the variables. We have two measures for the variable STOCK viz. MCAP (market capitalization) and TURN (turnover). REER is reported in two different forms-one based on export based weight and the other based on trade based weight. Thus we have two alternative sets of REER viz. REERX (export based weight) and REERT (trade-based weight). To save space we have reported the test results for cointegration for REERX for the two STOCK variables i.e. MCAP and TURN in Table 2 and Table 3 respectively. Table 2 suggests there exist five cointegrating vectors among these eleven variables. From Table 3 we observe that four cointegrating vectors are there among the I(1) variables. It may be noted that using the REERT variable we got similar results which are not reported here. These findings imply that there exists a stable long-run equilibrium relationship between the real rate of growth, indicators of financial development and other macroeconomic fundamentals in the post-reform period in India.

Existence of the cointegration between the set of I(1) variables in our exercise validates the estimation of equations (12) – (15) by OLS method of estimation in spite of the fact that all the variables are I(1). Estimated results for MCAP are reported in Tables 4 and 5 using REERX and REERT, respectively, as measures of REER. Similarly, estimated results for TURN using two alternative measures of REER are reported in Tables 6 and 7.

Table 2.
Johansen Cointegration Test for MCAP with REERX
RGDP, INV, MCAP, INT, REERX, DEBTLAG, INFL, WEALTH, INTDIFF, CAB, FOREX
(VAR lag =1)

	Maximum Eigenvalue test	5% critical value
H_0: r=0	134.96*	70.53
H_0: r≤ 1	107.06*	64.50
H_0: r≤ 2	94.88*	58.43
H_0: r≤ 3	75.97*	52.36
H_0: r≤ 4	60.60*	46.23
H_0: r≤ 5	28.40	40.07
	Trace test	5% critical value
H_0: r=0	552.52*	285.14
H_0: r≤ 1	417.55*	239.23
H_0: r≤ 2	310.49*	197.37
H_0: r≤ 3	215.61*	159.52
H_0: r≤ 4	139.64*	125.61
H_0: r≤ 5	79.04	95.75

Note : (i) r denotes the number of cointegrating vectors
(ii) * indicates rejection of the null hypothesis at 5% critical value.

Table 3.
Johansen Cointegration Test for TURN with REERX
RGDP, INV, TURN, INT, REERX, DEBTLAG, INFL, WEALTH, INTDIFF, CAB, FOREX
(VAR lag =1)

	Maximum Eigenvalue test	5% critical value
H_0: r=0	136.08*	70.53
H_0: r≤ 1	111.17*	64.50
H_0: r≤ 2	97.48*	58.43
H_0: r≤ 3	82.11*	52.36
H_0: r≤ 4	45.61	46.23
	Trace test	5% critical value
H_0: r=0	544.20*	285.14
H_0: r≤ 1	408.11*	239.23
H_0: r≤ 2	296.94*	197.37
H_0: r≤ 3	199.46*	159.52
H_0: r≤ 4	117.34	125.61

Note : Same as in Table 2

Table 4.
Estimated models for MCAP with REERX

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	-709.21	-830.57	-762.33	-863.20
	(-3.06)*	(-3.49)*	(-3.32)*	(-4.01)*
INV	2890.37	3402.78	3188.81	3500.43
	(3.28)*	(3.80)*	(3.62)*	(4.28)*
MCAP	-2.51E-05	-3.69E-05	-3.16E-05	-3.46E-05
	(-1.83)**	(-2.36)**	(-2.33)**	(-2.71)*
INT	5.59	5.33	4.75	6.04
	(1.98)**	(1.86)**	(1.68)***	(2.27)**
REERX	0.11	0.29	0.17	0.29
	(0.39)	(0.84)	(0.58)	(1.05)

(Contd.)

(Table 4 Contd.)

DEBTLAG	-2.70	5.94	10.59	2.26
	(-0.12)	(0.29)	(0.49)	(0.11)
INFL		0.007		
		(0.07)		
INFL1		0.09		0.10
		(0.91)		(1.48)
DINFL			-0.03	
			(-0.53)	
DINFL1			0.01	
			().21)	
WEALTH	-17.47	-21.19	-21.22	-20.92
	(-3.89)*	(-4.81)*	(-4.46)*	(-5.05)*
INTDIFF	-4.02	-4.05	-4.21	-4.05
	(-2.03)*	(-2.20)*	(-2.19)**	(-2.27)**
CAB		-0.0001		
		(-0.53)		
CAB1		-0.0001		0.0001
		(-0.71)		(-0.86)
DCAB			-4.53E-05	
			(-0.27)	
DCAB1			-0.0001	
			(-0.69)	
FOREX		7.19E-06		
		(0.78)		
FOREX1		-1.41E-05		-1.54E-05
		(-1.56)		(-1.80)***
DFOREX			1.22E-05	
			(1.75)***	
DFOREX1			2.72E-06	
			(0.37)	
	R^2 = 0.39	R^2 = 0.56	R^2 = 0.54	R^2 = 0.55
	$\bar{R}^2$ = 0.28	$\bar{R}^2$ = 0.40	$\bar{R}^2$ = 0.36	$\bar{R}^2$ = 0.43
	SER = 9.27	SER = 8.40	SER = 8.71	SER = 8.20
	AIC = 7.44	AIC = 7.33	AIC = 7.40	AIC = 7.24
	SC = 7.74	SC = 7.88	SC = 7.96	SC = 7.67

Notes: (i) * implies significant at 1% level.

(ii) ** implies significant at 5% level

(iii) *** implies significant at 10% level

Table 5.
Estimated Models for MCAP with REERT

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	-707.72	-823.55	-758.4190	-862.40
	(-3.06)*	(-3.45)*	(-3.30)*	(-3.99)*
INV	2882.75	3371.69	3171.22	3487.96
	(3.23)*	(3.76)*	(3.60)*	(4.26)*
MCAP	-2.46E-05	-3.49E-05	-3.06E-05	-3.39E-05
	(-1.79)**	(-2.23)**	(-2.25)**	(-2.65)*
INT	5.57	5.30	4.69	6.06
	(1.97)**	(1.82)***	(1.65)***	(2.27)**
REERT	0.11	0.27	0.15	0.31
	(0.34)	(0.68)	(0.47)	(0.97)
DEBTLAG	-2.78	5.75	10.37	2.13
	(-0.13)	(0.28)	(0.48)	(0.10)
INFL		0.01		
		(0.10)		
INFL1		0.09		0.11
		().96)		(1.49)
DINFL			-0.03	
			(-0.53)	
DINFL1			0.01	
			(0.21)	
WEALTH	-17.45	21.09	-21.15	-20.94
	(-3.88)*	-(-4.77)*	(-4.44)*	(-5.03)*
INTDIFF	-3.96	-3.93	-4.08	-4.01
	(-1.97)**	(-2.11)**	(-2.10)**	(-2.22)**
CAB		-9.74E-05		
		(-0.44)		
CAB1		-0.0001		-0.0001
		(-0.69)		(-0.84)
DCAB			-4.15E-05	
			(-0.25)	
DCAB1			-0.0001	
			(-0.68)	

(Contd.)

(Table 5 Contd.)

FOREX		7.39E-06		
		(0.80)		
FOREX1		-1.41E-05		-1.55E-05
		(-1.56)		(-1.81)**
DFOREX			1.23E-05	
			(1.76)***	
DFOREX1			2.73E-06	
			(0.37)	
	R^2 = 0.39	R^2 = 0.56	R^2 = 0.54	R^2 = 0.55
	$\bar{R}^2$ = 0.28	$\bar{R}^2$ = 0.39	$\bar{R}^2$ = 0.36	$\bar{R}^2$ = 0.42
	SER = 9.27	SER = 8.43	SER = 8.72	SER = 8.22
	AIC = 7.44	AIC = 7.34	AIC = 7.41	AIC = 7.24
	SC = 7.74	SC = 7.88	SC = 7.96	SC = 7.67

Notes: (i) * implies significant at 1% level.
(ii) ** implies significant at 5% level
(iii) *** implies significant at 10% level

From Table 4 it appears that the independent variables have high explanatory power to explain the variation in economic growth because adjusted R^2 varies between 0.28 to 0.42. It is found that the investment-output ratio (INV) has positive significant effect in all the four models, which is expected. The stock market development indicator MCAP bears a negative sign and it is statistically significant at 5% level in all the four models. Thus we can generally say that development in the stock market has not influenced economic growth in India in the post–reform period. However, it is interesting that the money market interest rate INT is positive and statistically significant in all the four models. This implies that a rise in the money market interest rate, which indicates the effect of the banking system reform, has improved the growth rate of the real GDP in the post-reform period. This seems counter-intuitive. It is true that investors in India often complained about the high cost of borrowing because of the high rate of interest in India in the post-reform period. However, various other factors favourable

to investors perhaps outweighed the high cost of borrowing, and as a result investment boomed in spite of rising interest.

The variable real wealth (WEALTH) is found to have negative significant effect on economic growth. It seems that in India an increase in real wealth has negative effect on the savings rate through which the real rate of growth is also negatively affected. The interest rate differential (INTDIFF) is also observed to have negative significant effect on economic growth. Therefore, although an increase in interest rate differential increases net inflows of capital it has not helped improve economic growth. This result seems to be due to the nature of capital inflows in India in the post-reform period which is predominated by portfolio capital flows in the latter half of the nineties. It is well known that portfolio capital flows are highly speculative in nature. Thus our finding suggests that this particular capital flow is not contributing to the real sector of the economy. The lagged value of foreign exchange reserves and first difference of the same variable are found to be significant in two alternative specifications. It may be noted that the three variables REER, DEBTLAG and INFL have no significant effect on the real rate of growth of GDP. These findings are perhaps due to the reason that macroeconomic uncertainties, reflected through the fluctuations in these three variables, remained under control during the post-reform period in India.

Table 6.
Estimated Models for TURN with REERX

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	-424.11	-495.86	-385.42	-515.17
	(-2.20)**	(-2.13)**	(-1.91)**	(-2.57)*
INV	1798.57	2163.86	1724.19	2178.23
	(2.34)**	(2.36)**	(2.13)**	(2.77)*
TURN	6.24E-05	5.01E-05	8.81E-05	6.65E-05
	(0.65)	(0.50)	(0.84)	(0.75)

(Contd.)

(Table 6 Contd.)

INT	2.56	2.15	0.97	2.57
	(1.09)	(0.76)	(0.39)	(1.01)
REERX	-0.27	-0.37	-0.30	-0.26
	(-1.31)	(-1.70)***	(-1.44)	(-1.31)
DEBTLAG	-19.02	-8.87	-9.67	-16.32
	(-0.87)	(-0.40)	(0.43)	(-0.77)
INFL		0.08		
		(0.76)		
INFL1		0.16		0.11
		(1.51)		(1.39)
DINFL			-0.03	
			(-0.48)	
DINFL1			0.003	
			(0.04)	
WEALTH	-12.10	-15.35	-13.70	-14.37
	(-2.77)*	(-3.15)*	(-2.74)*	(-3.34)*
INTDIFF	-0.54	-0.66	0.27	0.0006
	(-0.31)	(-0.31)	(0.15)	(0.0003)
CAB		0.0001		
		(0.56)		
CAB1		-9.10E-05		-3.07E-05
		(-0.44)		(-0.16)
DCAB			-1.13E-05	
			(-0.06)	
DCAB1			-7.17E-05	
			(-0.40)	
FOREX		1.08E-05		
		(1.10)		
FOREX1		-1.36E-05		-1.52E-05
		(-1.39)		(-1.63)
DFOREX			1.42E-05	
			(1.91)**	
DFOREX1			4.07E-06	
			(0.53)	
	R^2 = 0.34	R^2 = 0.49	R^2 = 0.48	R^2 = 0.47
	$\bar{R}^2$ = 0.23	$\bar{R}^2$ = 0.30	$\bar{R}^2$ = 0.27	$\bar{R}^2$ = 0.32
	SER = 9.59	SER = 9.03	SER = 9.30	SER = 8.92
	AIC = 7.50	AIC = 7.47	AIC = 7.54	AIC = 7.41
	SC = 7.81	SC = 8.02	SC = 8.09	SC = 7.84

Notes: (i) * implies significant at 1% level.
(ii) ** implies significant at 5% level
(iii) *** implies significant at 10% level

Table 7.
Estimated Models for TURN with REERT

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	-429.03	-505.30	-396.97	-519.15
	(-2.23)**	(-2.18)**	(-1.95)**	(-2.59)*
INV	1830.80	2225.57	1789.33	2208.05
	(2.36)**	(2.42)**	(2.15)**	(2.79)*
TURN	6.13E-05	4.76E-05	8.48E-05	6.56E-05
	(0.64)	(0.47)	(0.81)	(0.74)
INT	2.54	2.08	0.94	2.53
	(1.09)	(0.75)	(0.38)	(1.008)
REERT	-0.31	-0.44	-0.35	-0.30
	(-1.34)	(-1.78)***	(-1.49)	(-1.35)
DEBTLAG	-18.65	-7.73	-8.82	-15.85
	(-0.85)	(-0.35)	(-0.39)	(-0.75)
INFL		0.09		
		(0.83)		
INFL1		0.16		0.11
		(1.54)		(1.39)
DINFL			-0.03	
			(-0.42)	
DINFL1			0.006	
			(0.09)	
WEALTH	-12.13	-15.56	-13.95	-14.42
	(-2.79)*	(-3.20)*	(-2.77)*	(-3.36)*

(Contd.)

(Table 7 Contd.)

INTDIFF	-0.51	-0.65	0.28	0.03
	(0.29)	(-0.31)	(0.15)	(0.01)
CAB		0.0001		
		(0.55)		
CAB1		-8.86E-05		-2.90E-05
		(-0.43)		(-0.15)
DCAB			-1.47E-05	
			(-0.08)	
DCAB1			-7.85E-05	
			(-0.44)	
FOREX		1.11E-05		
		(1.13)		
FOREX1		-1.33E-05		-1.50E-05
		(-1.37)		(-1.61)
DFOREX			1.42E-05	
			(1.92)***	
DFOREX1			4.06E-06	
			(0.53)	
	R^2 = 0.34	R^2 = 0.50	R^2 = 0.48	R^2 = 0.47
	$\bar{R}^2$ = 0.23	$\bar{R}^2$ = 0.31	$\bar{R}^2$ = 0.28	$\bar{R}^2$ = 0.32
	SER = 9.58	SER = 9.00	SER = 9.27	SER = 8.90
	AIC = 7.50	AIC = 7.47	AIC = 7.53	AIC = 7.40
	SC = 7.81	SC = 8.01	SC = 8.08	SC = 7.84

Notes: (i) * implies significant at 1% level.
(ii) ** implies significant at 5% level
(iii) *** implies significant at 10% level

A comparison of the adjusted R^2 values shows that it is highest in model 4. Similarly the standard error of regression (SER) is the least in the case of model 4. Akaike information criteria (AIC) and Schwartz criteria (SC) are also the least in model 4. Thus from Table 4 model 4 appears to be the best specification. Interpretation of Table 5 does not differ much

from that of Table 4. In Table 5 too model 4 appears to be the best specification.

Using the alternative stock market development indicator TURN we have estimated the equations (12) – (15). The estimated results using REERX and REERT in two sets of estimation are reported in Table (6) and (7) respectively. Both the Tables (6) and (7) show that investment-output ratio have positive significant effect on economic growth. But neither TURN nor INT appears to be significant. WEALTH has a negative significant effect. The first difference of foreign exchange reserve appears to have a positive significant effect on economic growth in model (3). However, comparing the R^2 values and all other model selection criteria model (4) appears to be the best specification. However, from the findings of Tables (6) and (7) it is evident that stock market development measured by turnover seems to have no effect on economic growth.

VI. Conclusion

This paper has examined the impact of the financial sector developments on economic growth in India in the post-reform period. First, the models of Pagano (1993) and Murinde (1996) were extended to establish the relationship between financial development and economic growth in the structure of an endogenous growth model. The model was then estimated using quarterly data for the period 1993 to 2005 for India.

The estimated result shows that investment-output ratio has a positive significant effect on real rate of growth of GDP, irrespective of the indicator of stock market development. i.e. either market capitalization or turnover. An increase in the market capitalization appears to have a negative effect on the economic growth in India. On the other hand, an increase in the money market rate of interest has a positive significant effect on economic growth. Real wealth and interest rate differential have negative significant effect, the latter of which is perhaps due to the speculative nature of portfolio capital flows in India in the

later half of the nineties. The lagged values of foreign exchange reserves appear to have a marginally significant negative effect on economic growth.

The findings therefore lend weak support to the theoretical prediction that the stock market development would play an important role in enhancing economic growth in India. Banking system reform, on the other hand, appears to have promoted economic growth significantly. The results lend support to the view that stock market development may not speed up economic growth process in the developing countries (Singh, 1997). These results imply that in India stock markets are no substitutes for the Banking sector, unlike in some emerging economies like Chile and Mexico. Our findings have further implication that liberalization of the foreign portfolio flows in the Indian stock market since 1991 has not interacted with the real sector of the economy effectively. Rather, the volatility of the foreign portfolio flows created some macroeconomic management problems for the policymakers.

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