Finance in Growth and Growth in Finance: An Indian Experience during 1971:1-2006:4

A K Seth* & Rajni**

ABSTRACT

This paper tries to examine the causal direction between financial development and growth in the Indian economy by using the Granger Causality test and Johnson Juselius co-integration test during the period 1970-71 to 2005-06 on quarterly data. To perform this analysis we employed five indicator of financial development while the economic growth has been measured by real GDP and log real GDP. The result of the study indicates bi-directional causality between liquid liabilities to GDP and domestic credit to GDP ratio. Where as other variables indicated uni-directional causality flowing from economic growth to financial development. However on the levels of first differences unidirectional causality from economic growth to financial development is indicated during the period. The result of the co-integration analysis also indicate the long run equilibrium relationship exist between the financial development and growth. To some extent this development supports the idea that modern financial systems have developed as a consequence of the needs of the real sector and has also had feed back reinforcement in case of some variables. It means that economic policies that affect have impact on GDP enforce financial development and development of the financial sector further impacts the growth of the economy.

Introduction

There is a great consensus, in the ever increasing number of empirical and theoretical works on the relationship between economic growth and financial deepening is that a well developed financial system is essential in fostering a country's economic growth. A number of empirical studies have been conducted to assess the causal relationship between them. Robinson (1952) reports that financial development follows economic growth or causation between them may be bi-directional. In his view, the more developed a financial system is the higher the likelihood of growth causing finance. Since the seminal work of Patrick (1966) which first postulated a bi-directional relationship between financial development and growth a large empirical literature has emerged testing this hypothesis. Later the famous contributions were made by McKinnon (1973) and Shaw (1973), who asserted that the development of the financial sector would accelerate economic growth. It is not surprising that the emphasis has been placed on the importance of the development of financial markets for institutions accelerating economic growth. Modern growth theory has emphasized the importance of other factors such as education, political stability, openness but the existence of a well functioning financial system is regarded as critical. King and Levine (1993) reports that higher levels of financial developments are significantly correlated with economic growth and conclude that financial development leads to economic growth.

Demetriades & Luintel (1996), Fry (1997), Ahmed and Ansari (1998) and King & Levine (1993) are examples of econometric studies that found a positive relationship between financial development and growth. In other study, Singh (1997) defended that financial deepening increases the macroeconomic instability, showing a negative effect of financial deepening over growth. It is worth observing that recent research at the World Bank has also recognized the need for further research to investigate causality between financial deepening and economic growth in developing countries. Particularly to the World Bank, this issue is of paramount importance in light of the massive resources it has provided to many developing countries in recent years to improve their financial markets as a means to foster economic development. Many econometric studies have used the causality test to study the relationship that exists between financial deepening and economic growth. Since there are two opposing views about causation, the causality relationship between economic growth and

* *Professor, Commerce, Delhi School of Economics, University of Delhi*
** *Assistant Professor, Commerce, Bharati College, University of Delhi*

financial deepening has become a controversial issue. Basically the debate has been centered around whether it is the financial development that leads the economic growth or vice versa. This "financial development and economic growth puzzle" is complicated by another view that the relationship is dynamic in nature and that there can be trade off between the two. To date, there is no clear-cut solution on which policy makers could rely upon for incorporating the relationship into decision making. Many approaches have been modeled to show causality in a temporal system (e.g. Granger (1969), Sims (1972), Geweke (1982)) however most existing empirical studies uses granger causality modeling to investigate these competing hypothesis. King and Levine and others suggest that the issue of causality is best addressed by time series technique on a country by country basis.

In this paper, we try to examine the causal direction between financial development and growth by using the Granger Causality test. We also apply the Johnson and Juselius co-integration technique to assess the long run equilibrium relationship between financial development and economic growth for Indian economy during the period 1971-72 to 2006-07 on quarterly data.

Theoretical Background

The direction of causality between financial development and economic growth has always been controversial issue. Over the last 50 years the debate about this relationship has swung from an initial consensus that financial development follow, or is at least interrelated with growth, to an almost equally consensual belief that sustained economic growth follows from financial development. Patrick identified two possible patterns in the causal relationship between financial development and economic growth i.e. supply leading and demand following. This hypothesis "supply-leading" postulates that the presence of efficient financial markets increases the supply of financial services in advance of the demand for them in the real sector of the economy.

The "supply-leading" hypothesis has been advanced by many prominent economists like McKinnon (1973), Fry (1978), Diaz-Alejandro (1985), and Moore (1986). Earlier, Hicks (1969) believes that even history reveals that the industrial revolution in England in the 18th Century was not due to new technological inventions. According to him, financial reforms were the main culprit behind the British industrial revolution. Empirical work by Gelb (1989), Ghani (1992), King and Levine (1993 a,b), De Gregorio and Giudotti (1995), and Levine and Zervos (1996) supported the supply-leading hypothesis in the case of many developing and developed countries. The statistical basis of this support is that the empirical results revealed statistically significant coefficients on the proxies of financial deepening in the real economic growth equations.

Although plausible, this supply –leading hypothesis is not the only possible description of reality. Indeed, many well-known scholars including Robinson (1952) and Patrick (1966) have long rejected this hypothesis on purely theoretical grounds. They argue that financial deepening is merely a by-product or an outcome of growth in the real side of the economy, a contention recently revived by Demetriades and Hussein (1996). This alternative view is often called the "demand-following" hypothesis since financial market develops a progress following the increased demand for their services from the growing real economy.

The preceding discussion reveals that there are at least two opposite patterns of the causal relationship between financial deepening and real economic growth, each with strikingly different policy implications. The supply –leading hypothesis contends that financial development causes (induces) real economic growth, while the demand-following hypothesis argues for a reverse causal ordering from real economic growth to financial development.

Interestingly, there is still another group of well-known economists who maintain that financial

deepening is almost totally independent of economic growth. In his recent survey of literature of development economics, Stern (1989) completely ignored the role of financial development in the economic growth process. Robert Lucas too, the most recent Nobel Laureate in economics, seem to ascribe to this view. In a study describing the dynamics of economic development, Lucas (1988) argued that economists have generally exaggerated the importance of financial markets in economic development and that these markets at best play only a very minor role in the economic growth process. If valid, the Stern-Lucas proposition denies any reliable causal relationship between financial deepening and real economic growth. Thus, a third pattern emerges implying that the two variables are causally independent.

Besides the above three distinct causal hypotheses, a fourth and final proposition can be inferred which is a combination of the supply-leading and demand-following hypotheses. That is, both hypotheses are jointly valid, making financial deepening and real economic growth process. If valid, this Stern-Lucas proposition denies any reliable causal relationship between financial deepening and real economic growth. This type of causality pattern seems likely especially over the long run. Greenwood and Smith (1997) have also advanced a similar view in their recent survey. Within these theoretical underpinnings the paper tries to investigate annual relationship between financial development and economic growth.

Data sources and methodology

We constructed five indicators to measure level of financial sector development. We used quarterly data for our study and period of study is from 1970 to 2006. These indicators are similar used as in the study of King and Levine (1993). The measure of financial depth equals the ratio of liquid liabilities of the financial system to GDP which we term LQGDP. Liquid liability consists of currency held outside the banking system plus demand and interest bearing liabilities of bank and non-bank financial intermediaries. To measure importance of financial institutions three variables have been constructed (a) ratio of commercial money bank asset to commercial money bank assets plus central bank assets and call this variable BANK, (b) The second indicator is the proportion of credit allocated to private enterprise by the financial system. This measure equals the ratio of claims on the non financial private sector to total domestic credit (excluding credit to money banks) and we call this indicator PRIVATE, (c) Third indicator is the ratio of domestic credit to GDP. It represents the domestic assets of the financial sector and is expected to increase in response to improved price signaling represented by DCGDP. Since credit generates fixed capital therefore another measure measuring capital formation has been use and is termed INV. It equals the ratio of gross fixed capital formation to GDP call as INV. To measure economic growth we used the indicator log real GDP (LRGDP) and growth rate of real GDP (GRGDP). The quarterly series of GDP for India was not available till 1996. Therefore the quarterly GDP series for India has been generated from the annual series by following the methodology used by Lisman and Sandee (1964), Denton (1971), Shetty and Das (1990), Sukumar Nandi (1994). The annual GDP for India is taken from RBI bulletin. The entire variables are in real value.

Granger causality tests have been used which also requires testing of unit roots in the variables.

We performed unit root tests before undertaking the causality tests If a variable is found to have a unit root, we include the first difference of the variable in our causality tests only if the first difference is found to be stationary. The Dickey - Fuller tests indicated that all the variable were integrated of order I(0) and I(1). Granger causality test for integrated variable assumes the form:

$$\Delta Yt = \alpha + \sum_{i=1}^{n} \beta i \Delta Yt-i + \sum_{j=1}^{m} Yj \Delta Xt-j + \phi \varepsilon_{t-1} + Ut$$

$$\Delta Xt = \alpha + \sum_{i=1}^{n} \beta i \Delta Xt-i + \sum_{j=1}^{m} Yj \Delta Yt-j' + \phi \varepsilon'_{t-1} + U't$$

To reject the null hypothesis that x Granger causes y, it is necessary not to reject that $\Sigma j\text{-}1\ m\ Yt\Delta xt\text{-}j = 0$ (this can be verified by F test).

For examining the long run causality we need to test for co-integration if the variables are non-stationary in their levels. Generally a set of variable is said to be co-integrated if a linear combination of the individual series, which are I(d), is stationary, Intuitively, if Xt ~ I(d) and Yt ~ I(d), a regression is run such as :

$$Yt = \beta Xt + €t$$

If the residuals, €t are I(0), then Xt and Yt are cointegrated. We use Johansen's (1988) approach which allows as to estimate and test for the presence of multiple cointegration relationships, r, in a single step procedure. The tests for co-integration are based on a VAR framework, as initiated by Johansen (1988). In this paper, we use a bVAR (two-variable VAR case), where the co-integration test is for the null hypothesis H0 that there is no co-integration between the variables, against the alternative hypothesis Ha that there is only one co-integrating vector. Determining the number of cointegrating vectors: Johansen and Juselius (1992) describe two likelihood ratio tests: (a) a test based on the maximum eigen value wherein the null hypothesis tested is that there are at the most r co-integrating vectors; and (b) test based on the trace of the stochastic matrix wherein the null hypothesis tested is that there are at least 'r' or more co-integrating vectors. To implement these tests, the VAR lag length has to be decided upon. If co-integration between the variable exists at the level then we have to look for causality between first differences to ascertain the causal relationship.

Results

First we have performed the unit root test to find out the stationarity between the variable. To test stationarity of variables, we applied Augmented Dicky Fuller (ADF) and Phillips Pearson (PP) test on all the series. Following table shows the value of τ test statistics obtained by using ADF and PP test. Order of integration of some of the variable is equal to I(1) where as that of others is I(0). We need first difference of those variable which are not of order I(0). Order of integration of all the variable from the ADF and PP test is I(I).

Table 1. Unit root test for various variables

Variable	ADf	PP	Order of Integration
RGDP	-3.477028	-11.91373	I(1)
LQGDP	-5.025698	-12.44684	I(1)
BANK	-4.138247	-14.48902	I(1)
PRIVATE	-5.924882	-12.12370	I(1)
DCGDP	-7.509587	-8.406844	I(1)
INV	2.940634	7.052051	I(1)

Then we perform the Granger causality test to find out the causality between the various indicator of financial development and growth and the result are shown in the table-2.

Table 2. Granger-Causality test at LEVEL

Null Hypothesis	Observation	F-Statistics	Probability
LQGDP does not granger cause RGDP	146	2.51319	0.08463
RGDP does not granger cause LQGDP	146	9.49122	0.00014
PRIVATE does not granger cause RGDP	146	1.57763	0.21009
RGDP does not granger cause PRIVATE	146	15.1631	1.1E-06
BANK does not granger cause RGDP	146	1.48668	0.22964
RGDP does not granger cause BANK	146	11.0179	3.6E-05
DCGDP does not granger cause RGDP	146	4.17899	0.01725
RGDP does not granger cause DCGDP	146	3.66723	0.02801
INV does not granger cause RGDP	146	1.77756	0.17282
RGDP does not granger cause INV	146	5.72912	0.00405

The result of the Granger causality test indicate at level the uni-directional causality from economic

growth to financial development for the indicator PRIVATE, INV and BANK. In the case of LQGDP and DCGDP the direction of causality run both ways- finance may cause economic growth and economic growth may cause financial development. Economic growth causes a demand for financial intermediation and hence the financial system will grow in response to economic development in India.

Table 3. Granger-Causality test at Growth rate of Real GDP

Null Hypothesis	Observation	F-Statistics	Probability
LQGDP does not granger cause GRGDP	145	0.91441	0.40313
GRGDP does not granger cause LQGDP	145	0.78630	0.45753
PRIVATE does not granger cause GRGDP	145	0.87258	0.42012
GRGDP does not granger cause PRIVATE	145	0.62319	0.62319
BANK does not granger cause GRGDP	145	1.91039	0.15186
GRGDP does not granger cause BANK	145	17.9364	1.2E-07
DCGDP does not granger cause GRGDP	145	0.31974	0.72686
GRGDP does not granger cause DCGDP	145	0.98565	0.37577
INV does not granger cause GRGDP	145	0.86775	0.42214
GRGDP does not granger cause INV	145	3.81457	0.02437

The results of the Granger causality indicate uni-directional causality from economic growth to indicators INV and BANK. This implies that with increase in GDP of the country banks and investment expanded rather follow as a consequence of requirement. While no causality exist between financial development and growth for the indicator LQGDP, PRIVATE and DCGDP.

Then we apply the Bivariate co-integration technique proposed by Johanson and Juselius. The result of the co-integration analysis are shown in the following table:-

Table 4. Co-integrating Equation at LEVEL

Variable	lags	No of co-integrating vector	Co-integrating equation
RGDP, LQGDP	4	1	= -19.49378-0.108387 (LQGDP) (0.02924) Log Likelihood =-811.5546
RGDP, PRIVATE	4	2	= -30.17029 – 0.013055 (PRIVATE) (0.32747) Log likelihood = -763.9030
RGDP, DCGDP	4	1	= 11.65906-0.387854 (DCGDP) (0.10037) Log likelihood = -529.8090
RGDP, INV	4	1	= -39.63948 +0.680930 (INV) (4.23507) Log likelihood = -189.8880

The likelihood ratio test indicates one co-integrating equation at 5% level of significant except PRIVATE in which there are two co-integrating equation at 5% significant level. It means long run equilibrium relationship exist between LQGDP, BANK, INV and

Table 5. Co-integrating Equation For First difference of Variables

Variable	lags	No of co-integrating vector	Co-integrating equation
GRGDP, LQGDP	4	1	=-0.012874+(3.45E-07) (LQGDP) (4.9E-05) Log Likelihood =-364.6277
GRGDP, BANK	4	1	= -0.006194 - 0.009191 (BANK) (0.02389) Log likelihood = 7310395
GRGDP, PRIVATE	4	2	= 0.007586 – (9.1E-05) (BANK) (7.7E-05) Log likelihood = -298.6369
GRGDP, DCGDP	4	2	= -0.009716 – (2.86E-05) (DCGDP) (4.4E-05) Log likelihood = 519.7847
GRGDP, INV	4	2	= -0.009944 – 0.000264 (INV) (0.00039) Log likelihood = 274.8879

DCGDP. The long run relationship between RGDP and PRIVATE is unstable because the analysis show two co-integrating vector at 5% level of significance where as in other cases it show a long run stable relationship.

The result of the co-integration analysis in case of financial development and growth rate shows that for the variable PRIVATE, INV and DCGDP there are two co-integrating vector. The variables BANK and LQGDP show one co-integrating equation at 5% level of significance. Therefore LQGDP and BANK shows long run stable relationship where as in all other cases this shows non-unique relationships.

The result of our study indicate that economic growth causes financial development. If policy makers want to promote financial development then attention should be focused on long run policies, for example the creation of modern financial institutions, in the banking sector and stock market from that point of view, our finding confirm to earlier studies that reports routinely statistically significant coefficient of financial proxy variables on economic growth for example, Robinson (1952), Patrick (1966) and Demetriades and Hussein (1996). The finding as well as the findings in the present study is in consistent with the view that financial deepening is an outcome of the growth process.

IV Conclusion

In this study we tried to examine long run causal relationship between financial development and economic growth for India during the period 1970 to 2006 on quarterly data. We apply Granger causality test and co-integration analysis. The result of the study indicates bi-directional causality between liquid liabilities to GDP and domestic credit to GDP ratio. Where as other variables indicated uni-directional causality flowing from economic growth to financial development. However on the levels of first differences unidirectional causality from economic growth to financial development is indicated during the period. Our results support the Demand following hypothesis in case of India. The result of the co-integration analysis indicates the long run equilibrium relationship between financial development and growth. The result implies that the economic policies of the country have impact on the financial development of the country and the development of the financial sector is accordance with the growth need of the economy. Thus we see that in India the financial sector developed as a result of growth needs

References

Ahmed, Syed-M and Ansari, Mohammed I (1998); Financial sector development and economic growth; The South-Asian Experience; Journal of Asian Economic; Vol. 9(3); Pp. 503-17

Beck Thornton, Levine Ross and Loayza Norman (2000); Finance and the sources of Growth; Journal of Financial Economics; Vol. 58 (1-2); Pp. 261-300.

Carlos, Diaz-Alevandro (1985); Good Bye, financial repression-hello financial crash; Journal of development economics 19(1985) 1-24 North-Holland.

De Gregoria, J, and Guidetti P (1992); Financial development and economic growth; Mimoo;, International Monetary Fund

Demetriades P O and Hussein K A (1996); Does financial deepening cause Economic Growth? Time series evidence from 16 countries; Journal of development economics. Vol. 51; 387-411.

Demetriades, Panicos O and Lunitel Kul B (1996); Financial development, Economic Growth and Banking sector controls: Evidence from India; The Economic Journal.

Denton F P (1971); Adjustment of Monthly or Quarterly series to Annual Totals; An approach based on Quadratic Minimization; Journal of American Statistical Association; Vol. 66.

Diaz Alejandro (1985); Goodbye Financial Represssion, Hello Financial Crash; Journal of Development Economics; Vol. 19 (1-2); September-Octorber; Pp.1-24.

Fry M J (1978); Money and capital or financial deepening in economic development; Journal of Money, Credit and Banking; Vol. 10; Pp. 464-475.

Ghani Ejaz (1992); How financial markets affects long run growth: A cross country study; Washington D C; WB Country operations, PR working paper; WPS 843; January.

Gelb Alan H (1989); Financial policies, growth and efficiency; Washington D C; World Bank; Country Economics Department; PPR Working paper; WPS 202; June.

Greenwood J and Smith B D (1997); Financial markets in development and the development of financial markets; Journal of Economics Dynamics and control; Pp. 145-181.

Goldsmith R (1969); Financial Structure and Development; New Haven.

Granger C W J (1969); Investing causal relations by econometric models and cross-spectral methods; Econometrica; Vol. 37; Pp. 424-438.

Gurley J G and Shaw E S (1955); Financial Aspects of Economic Development; American Economic Review; (September) Pp. 515-37.

Geweke J (1982); Measurement of linear dependence and feedback between Time-series; Journal of the American Statistical Association Vol. 79; Pp. 304-24.

Hicks J R (1969); Capital essay in Monetary theory; Chapter-9; Claredon Press; Pp. 155-173.

Johansen P (1988); Statistical Analysis of Cointegrating Vectors; Journal of Economic Dynamics and Control Vol. 12; Pp. 231-54.

Johansen P and Juselius K (1992); Testing Structural Hypothesis in a Multivariate Cointegration Analysis of the PPP and UIP for the UK; Journal of Econometrics Vol. 53; Pp. 211-44.

King, R.G. and Levine, R. (1993a); "Finance and growth: Schumpeter might be right"; Quarterly Journal of Economics; 108(3): 717-737.

King, R.G. and Levine, R. (1993b); "Finance, Enterpreneurship and Growth; Theory and Evidence"; Journal of Monetary economics 32(3):513-542.

Levine, R. and S. Zervos (1996); "Stock Markets, Banks and Economic Growth"; World Bank Policy Research Working Paper 1690.

Lisman, J., and Sandee.J. (1964); "Derivation of quarterly figures from Annual Data" Applied Statistics; vol. 13.

Lucas, Robert. E., (1988); "On the mechanics of economic development" Journal of Monetary Economics; 22(1); July Pp. 3-42.

Maxwell, J. Fry. (1997); "In Favours of financial liberalization" The economic journal 1997; Pp. 754-770.

Moore, B.J. (Jan/Feb1986); "Inflation and financial deepening"; Journal of Development Economies; 20.125-133.

McKinnon, Ronald I., (1973); "Money, capital and economic development"; (The Brookings Institution, Washington, DC)

Nandi, Sukumar (1994); "Exchange Rate Behaviour of Indian Rupee in Controlled Foreign Exchange Regime: A Co-integration Approach"; Journal of Indian School of Political Economy; April-June; vol.6; No2; Pp. 257-272.

Patrick, H. (1966); "Financial Development and economic growth in Underdeveloped countries"; Economic Development and cultural change; (January); Pp. 174-189.

Shaw, E.S., (1973); "Financial deepening in economic development"; New York: Oxford University

Press 1973.

Sims, C.A., 1972; "Money, Income and causality"; American Economic Review; 62, 540-52

Singh, Ajit., (1997); "Financial liberalization, stock markets and economic development" The economic journal 107(May); 771-782

Shetty, S.L and Das R.K., (1990); "Quarterly Estimates of GDP, 1970-71 to 1987-88"; Working paper; RBI

Stern, Nicholas., (1985); "The economics of development: A survey"; Journal of money, credit and banking, May 1985; 17(2); Pp. 133-52.

Robinson Joan (1952); "The Generalization of the General Theory"; in the rate of interest and other essays; London.