Volume 29, Issue 3

Financial development and economic growth: a cointegration and error-correction modeling approach for south Asian countries

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Abstract

This paper assesses long-run causal relationship between financial development and economic growth for South Asian countries - India, Pakistan and Bangladesh for the period 1976 -2008. Financial development emanates from financial systems that encourage financial stability and foster a framework for the implementation of successful economic polices. Financial Systems can be divided into 'bank-based'' and 'capital-market-based'' categories. Bank-based financial systems are the close involvement of their banks with industrial firms; banks are the most important source of finance for industry. Capital-market-based financial systems are characterized by highly developed capital markets and banks. Bank-based financial systems may be in a good position to implement successfully expansionary monetary policy and industrial strategy. Financial liberalisation and repression may show a positive association between financial development and economic growth. We conduct cointegrated vector autoregressive model to assess long-run relationship between financial development and economic growth. Empirical results imply a stable relationship between financial development and economic growth for these countries. Results of error correction models indicate Granger causality between financial development and economic growth running from financial development to economic growth.

1. Introduction

In economics, the relationship between financial development and economic growth has received a great attention. 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 bidirectional. In his view, the more developed a financial system is, the higher the likelihood of growth causing finance.

Endogenous growth literature implies that a well-functioning financial system may have positive effect on growth through investment. Financial intermediaries facilitate the provision of adequate funds for investment activities. As the financial system expands more resources can be channelled through it and more funds will be available for investment. A well-developed financial system may lead to an improved ability to assess investment projects (Hansson and Jonung, 1997). The endogenous growth literature suggests that steady-state growth has been positively affected by financial intermediation (Pagano, 1993) and that the equilibrium growth rate has been negatively affected by government intervention in the financial system (King and Levine, 1993b).

The causality between financial development and economic growth is a controversial issue. King and Levine (1993a) reports that higher levels of financial development are significantly correlated with economic growth. They conclude that finance leads to economic growth.

The direction of causality between financial development and economic growth may run both ways – finance may cause economic growth and economic growth may cause financial development. Economic growth may create a demand for financial intermediation and hence the financial system will grow in response to economic development. The aim of this paper is to assess the causal relationship between financial development and economic growth in some Asian Countries –India, Pakistan and Bangladesh. We apply the multivariate cointegration technique proposed by Johansen (1988, 1991, 1992, and 1995) and Johansen and Juselius (1990, and 1992). This cointegration methodology tests the long-run equilibrium relationship between financial development and economic growth, and the error correction model in a multivariate framework examines the short-run dynamics by which financial development converges on long-run equilibrium values.

This paper is organised as follows. Section 2 gives an overview of finance and economic growth, Section 3 provides data and empirical methodology, Section 4 discusses estimated results and Section 5 concludes the paper.

2. Finance and Economic growth

De Gregario and Guidotti (1995) found that financial development leads to an improved growth performance. Wachtel and Rousseau (1995) examined the causal relationship between finance and growth in the United States, the United Kingdom and Canada and that their test for Granger-causality demonstrated that financial development causes economic growth. A study by Galetovic (1996) reports no causal relationship between financial development and economic growth.

Ünalmis (2002) investigates the direction of the causal relationship between the financial development and economic growth in Turkey using time series data for the period 1970-2001.

The Granger non-causality tests are applied. The empirical findings suggest that, in the short-run, causality runs from financial development to economic growth and in the long-run, there is a bidirectional causality between financial deepening and economic growth.

Harb and Mouawiya (2005) investigates the linkages between financial development and economic growth in the Middle East using newly developed methods of panel cointegration along with the popular time series methodologies such as the Johansen's cointegration, Granger causality, and the variance decompositions. The results indicate that, in the long run financial development and economic growth may be related to some level. In the short run, the panel causality tests point to real economic growth as the force that drives changes in financial development while individual countries' causality tests fail to give a clear evidence of the direction of causations.

Tang (2006) examines whether financial development would facilitate economic growth among the Asia-Pacific Economic Cooperation (APEC) countries from 1981 to 2000 using the modified growth model. It focuses on the effects of three aspects of financial development on growth: stock market, banking sector and capital flow. Results suggest that among the three financial sectors, only the stock market development shows strong growth-enhancing effect, especially among the developed member countries. This positive relationship remains very robust even after controlling for the simultaneity bias. Thus, there is no evidence to suggest that the level of financial infrastructure development does affect the overall finance - growth relationship.

Güryay, et. al. (2007) examine the relationship between financial development and economic growth in Northern Cyprus using Granger causality test. Results showed that financial development does not cause economic growth, but there is evidence of causality from economic growth to the development of financial intermediaries.

Ozturk (2008) reviews the literature on finance-growth nexus and investigate the causality between financial development and economic growth in Turkey for the period 1975-2004 in a vector autoregression (VAR) framework based on the theory of cointegration and error-correction representation of cointegrated variables. Results show the evidence of the existence of a long-run bidirectional relationship between financial development and economic growth.

Bank-based and capital-market-based financial systems as well as the effectiveness of government policies in the two systems may have implications concerning the issue of whether financial deepening becomes able to promote economic growth. Bank-based financial systems are the close involvement of banks with industrial firms. A close link exists between banks and industries in bank-based financial system. Company relies on bank loans that is the characteristic of bank-based financial system. Thus bank plays an important role in the process of economic development. The characteristics of capital-based financial system are highly developed capital markets and banks that have relatively low involvement in the allocation of funds of financial assets.

Bank-based financial system encourages long-term finance which is dedicated to long-term productive investment that reduces speculative activities. Thus bank-based financial system promotes financial stability and helps implement economic policies successfully. In bank-based financial system, financial and industrial capitals are so related that speculative finance can not influence real economic activity as it does in capital-market-based financial system. Bank-based

financial system may help implement expansionary monetary and industrial policy, given the relationship between financial and industrial firms (Arestis and Demetriades, 1996).

In developing economies, financial liberalization and financial repression influence economic growth. Financial liberalization is characterized by market determined interest rates which are attractive for surplus units. Financial deepening happens and investment increases. The abolition of directed credit programmes improves the quality of investment. Higher market determined rate of returns can be earned through investment projects. Thus in a liberalized financial system, financial development and economic growth is positively associated with the direction of causality running from financial development to economic growth. On the contrary, the characteristic of repressed financial system is that the government keeps artificially real interest rates lower. The quality of investment reduces because of limited amount of loanable funds rationed in accordance to government directives (directed credit programmes and concessionary lending rates). Both the quality and quantity of investment reduce which in turn affect economic growth. Despite, a positive relationship between financial development and economic growth can be obtained. However, in a repressed financial system financial deepening may not be as effective in promoting economic growth as in a liberalized system. Thus it seems that relationship between financial development and economic growth must be stronger under liberalized economies than under repressed economies (Arestis and Demetriades, 1996).

2. Data and Empirical Methodology

Causality relationship between financial development and economic growth is examined in this paper in vector autoregressive framework. Financial development is proxied as the ratio M2 to real GDP that is denoted by M2Y and economic growth is measured as the average rate of real per capita GDP that is denoted by Y. We use the data for a period from 1976 to 2008 for India, Pakistan and Bangladesh. The data are collected from Key Indicators of Developing Asian and Pacific Countries, Asian Development Bank.

The framework of cointegration testing procedures developed by Johansen (1988, 1991, 1995) and Johansen and Juselius (1990, 1992) can be applied to evaluate long-run relationships between economic variables. Therefore Johansen maximum likelihood procedure in a vector autoregressive framework can provide a basis for evaluating the long-run relationship between financial development and economic growth. We use Johansen cointegration procedure to test for the presence of a cointegrating vector between financial development and economic growth. The procedure is based on the maximum likelihood estimation of the error correction model (ECM):

$$\boldsymbol{D}x_t = \boldsymbol{h} + \boldsymbol{G_1}\boldsymbol{D}x_{t-1} + \boldsymbol{G_2}\boldsymbol{D}x_{t-2} + \ldots + \boldsymbol{G_{k+1}}\boldsymbol{D}x_{t-(k+1)} + \boldsymbol{p}x_{t-k} + \boldsymbol{e}_t \tag{1}$$

where the matrix $\boldsymbol{G}$ captures the short-run aspects of the relationship between the elements of x_t and the matrix $\boldsymbol{p}$ reflects the long-run information. There can be one or more than cointegrating relations in a multivariate cointegration model depending on the number of linear combinations of x_t. The rank of $\boldsymbol{p}$, denoted by r, can determine the number of cointegration relations. The matrix $\boldsymbol{p}$ can be decomposed in two matrices, $\boldsymbol{a}$ and $\boldsymbol{b}$ where $\boldsymbol{p} = \boldsymbol{ab'}$. The weights or the speed of adjustment (the error correction coefficients) are contained in matrix $\boldsymbol{a}$ that force the series back towards their underlying equilibrium relations and the cointegrating vectors are contained in matrix $\boldsymbol{b}$ that summarize the underlying long-run relations.

Further, $x_t = \begin{bmatrix} Y_t & M2Y_t \end{bmatrix}'$, $\boldsymbol{h}$ is a (2×1) vector of parameters, $\boldsymbol{G}_1, \boldsymbol{G}_2, ..., \boldsymbol{G}_{k+1}$ and $\boldsymbol{p}$ are (2×2) matrices of parameters, and $\boldsymbol{e}_t$ is a (2×1) vector of white noise errors. In this case, equation (1) can be rewritten in full as:

$$\begin{bmatrix} DY \\ DM2Y \end{bmatrix} = \begin{bmatrix} h_1 \\ h_2 \end{bmatrix} \begin{bmatrix} G_{i,11} & G_{i,12} \\ G_{i,21} & G_{i,22} \end{bmatrix} \begin{bmatrix} DY_{t-i} \\ DM2Y_{t-i} \end{bmatrix} + \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}' \begin{bmatrix} Y_{t-k} \\ DM2Y_{t-k} \end{bmatrix} + \begin{bmatrix} e_1 \\ e_2 \end{bmatrix} \tag{2}$$

Two likelihood ratio tests proposed by Johansen and Juselius (1990) are used to determine the number of cointegrating vector in x_t. These are the maximal eigenvalue test and the trace test. The maximal eigenvalue test assesses the null hypothesis that there are exactly r cointegrating vector against the alternative hypothesis that there is $r+1$. The maximal eigenvalue test uses the $(r+1)$ eigenvalue and is given by

$$\boldsymbol{t}_{max} = -N \ln \left[1 - \Pi_{(k+1)}^2 \right] \tag{3}$$

The trace test evaluates the null hypothesis that there are r or less cointegrating vectors against the alternative hypothesis that there are more than r. This test is expressed by

$$\boldsymbol{t}_{trace} = -N \sum_{i=r+1}^{p} \ln \left(1 - \Pi_i^2 \right) \tag{4}$$

Of these two likelihood ratio tests, the trace test may lack power relative to the maximum eigenvalue test (Johansen and Juselius, 1990). For these two tests, asymptotic critical values corrected for degrees of freedom are provided by Reimers (1992)

4. Result Discussions

We present the results of Johansen multivariate procedure for India, Pakistan and Bangladesh in Table 1. Both the maximum eigenvalue and trace tests reject the null hypothesis of no cointegration $(r = 0)$, at both 5 per cent and 10 per cent levels of significance for India and Bangladesh because the test statistics of 20.9549 and 29.2626 for India and 17.0796 and 22.7010 for Bangladesh exceed their respective critical values respectively. Consequently results accept the alternative hypothesis of $r = 1$. This implies that financial development and economic growth in India and Bangladesh have cointegration relation and that there is only one cointegrating vector.

Table 1: Results of Johansen multivariate Cointegration Test (order of var = 2) for India, Bangladesh and Pakistan

Hypotheses		Statistic			Critical value	
Null	Alternative	India	Pakistan	Bangladesh	5 %	10 %
Maximum eigenvalue test						
$r = 0$	$r = 1$	20.9549	15.1725	17.0796	14.88	12.98
$r <= 1$	$r = 2$	4.3077	2.0064	5.6214	8.07	6.5
Trace test						
$r = 0$	$r = 1$	29.2626	17.1788	22.701	17.86	15.75
$r <= 1$	$r = 2$	4.3077	2.0064	5.6214	8.07	6.5

Note: r denotes the number of cointegrating vectors.

For Pakistan, according to the maximum eigenvalue test, the null hypothesis of no cointegration *(r=0)* is rejected at both 5 per cent and 10 per cent level of significance and alternative hypothesis *(r = 1)* is accepted showing that there is only one cointegration vector of the relations of financial development and economic growth. The trace test at 10 per cent level of significance shows cointegration with one cointegrating vector, although at 5 per cent level of significance it concludes that there is no cointegration vector. As the maximum eigenvalue test may have more power relative to the trace test (Johansen and Juselius, 1990), we can take the results given by the maximum eigenvalue test that financial development and economic growth are cointegrated with only one cointegrating vector.

Results of Granger causality based on error correction models are presented in Table 2. Coefficients of the error correction terms for the cointegrating equation $Y_t = f(M2Y)$ for India, Pakistan and Bangladesh are all significant. This implies that causal relationships exist between financial development and economic growth for these economies and financial development stimulates economic growth. These results conform to those obtained by King and Levine (1993a).

Table 2: Results of Causality between Financial Development and Economic Growth using ECM based on Cointegration Regression

	Cointegration Regression: $Y_t = f(M2Y)$				Cointegration Regression: $M2Y_t = f(Y_t)$			
	ECT	T-ratio	F-statistic	R^2	ECT	T-ratio	F-statistic	R^2
India	9.9060	3.5393	17.7163	0.8692	-0.0004	-0.0240	0.5570	0.1728
Pakistan	9.0000	13.6265	36.0584	0.5987	0.0523	1.8149	2.2015	0.0777
Bangladesh	3.2000	12.3042	36.3860	0.6026	9.7694	0.9205	2.8335	0.1056

On the other hand, coefficients of the error correction term based on the cointegration equation $M2Y_t = f(Y_t)$ are insignificant for India, Pakistan and Bangladesh. This shows that economic growth does not cause financial development in these countries.

Financial development and economic growth are causally related with each other in India, Pakistan and Bangladesh, and causality runs from financial development to economic growth. This suggests that higher financial development would lead to higher economic growth in India, Pakistan and Bangladesh.

5. Conclusion

We examine long-run causal relationship between financial development and economic growth for South Asian countries – India, Pakistan and Bangladesh for the period 1976 – 2008. We apply multivariate cointegration techniques to evaluate the relationship. Results imply that financial development and economic growth are positively cointegrated in the long-run and that there is only one cointegrating vector for India, Pakistan and Bangladesh indicating a stable long-run relationship between financial development and economic growth. Results also suggest that there is a unidirectional causality between financial development and economic growth running from financial development to economic growth. This means that financial development improves economic growth in India, Pakistan and Bangladesh.

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