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Financial development and economic growth in Sri Lanka

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Abstract
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Keywords
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FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN SRI LANKA

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This study investigates the causal relationship between financial development and economic growth in Sri Lanka over the period 1955 to 2005. After considering the time series characteristics of six measures of financial development, Johansen cointegration and the appropriate Error Correction Model are used to investigate the causal relationship between financial development and economic growth. The findings suggest that broad money causes economic growth with two-way causality. The major finding of this study does not strongly support the view that financial development boosts economic growth.

Keywords: Financial Development, Economic Growth, Sri Lanka, Cointegration test

JEL Classification: O11 and C32

1. Introduction
The relationship between financial development and economic growth has attracted widespread attention in the past three decades and there have been a large number of studies on this area. Bagehot (1873) argued that financial development played an important role for channelling the industrialisation process in England. Goldsmith (1969), Hicks (1969), McKinnon (1973) and Shaw (1973) explained the link between financial development and economic growth showing the significant contribution of financial development in economic growth. It is claimed that financial development helps to identify better investment opportunities, reduces productive cost, mobilises savings, boosts technological innovation and enhances the risk taking capacity of investors (Levine 1997). On the other hand, Robinson (1952) proposed that financial development is followed by economic growth and financial development itself is not a leading factor to growth. Lucas (1988) found that economists are ‘badly over stressed on financial development for growth’. The main objective of this paper is to investigate the causal relationship between financial development and economic growth using time series data from 1955 to 2005. Sri Lanka provides a good case study as it commenced the financial liberalisation process in 1977. The contribution of this paper differs from previous studies in several ways; a longer time series of data is used with several, rather than one single indicator of financial development measures and new econometric methodology for empirical testing is employed.

The organisation of this paper is as follows: section two presents a brief survey of literature on financial development and economic growth based on theoretical and empirical studies; the details of data and methodology used in this paper is presented in section three; the results of empirical testing from the time series data of Sri Lanka and their economic interpretation are presented in section four; the conclusion of the study is presented in section five.

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2. Literature Survey

Bagehot (1873), Schumpeter (1934), Goldsmith (1969), Hicks (1969), McKinnon (1973) and Shaw (1973) explored the relationship between financial development and growth focusing on the services provided by financial intermediaries. McKinnon and Shaw (MacKinnon, 1973 and Shaw, 1973) examined the impact of government intervention on the development of financial systems concluding that government restrictions on the banking system, such as interest rate ceilings and direct credits negatively affect the development of the financial sector and harm economic growth.

Jansen (1990) found that financial development contributes to economic growth, if proper allocation of financial resources is made for the efficient mobilisation of production factors. Patrick and Park (1994) examined the role of financial development for economic growth in three countries; Japan, Korea, and Taiwan. Becsi and Wang (1997) observed that financial intermediation plays an important role in the economy. Ahmed and Ansari (1998) examined the relationship between financial development measures and economic growth for three South Asian countries, India, Pakistan and Sri Lanka, based on the result of correlation analysis, Granger causality and Cobb-Douglas production function type equation for pooling data. The major finding of this study is that the governments in these countries were able to promote economic growth by encouraging financial sector development. Khan (1999) analysed the relationship of financial development and economic growth by developing a theory of financial development based on the cost of the provision of external finance. He concluded that financial development reduces the costs of external finance and accelerates the rate of economic growth; on the other hand, he predicts financial development would raise the return on loans and reduce the spread gap between borrowing and lending rates.

Deidda and Fattouh (2002) presented a simple model to establish a non-linear relationship between financial development and economic growth. They suggested that no significant relationship between financial development and economic growth is found in low-income countries. Gregori and Guidotti (1995) examined the empirical relationship between long-run growth and financial development for Latin America. They found a positive relationship between the variables across the countries using cross country data and a negative relationship across countries from panel data analysis. Jean and Varoudakis (1996) used a large sample of cross-country data to conclude that the developed financial sectors favour growth by mobilising savings. Demetriades and Hussein (1996) conducted causality tests between financial development and real GDP using time series data. The paper concluded that finance is a leading sector for economic development and there are different causality patterns across countries. In some cases the study found evidence that economic development systematically causes financial development. It shows the bi-directional relationship between financial development and economic growth.

Sinha and Macri (1999) studied the relationship between financial development and economic growth in eight Asian countries and concluded that a significant positive relationship exists between the income and financial variables for some countries. Kar and Pentecost (2000) examined the causal relationship between financial development and economic growth in Turkey. They developed five alternative proxies for financial development and suggested that the direction of causality between financial development
and economic growth in Turkey was sensitive to the choice of proxy used for financial development.

Rioja and Valev (2002) studied the effects of financial development on the sources of growth in different groups of countries with the panel data of 74 countries using GMM (Generalised Method of Moments) dynamic panel techniques. They found strong positive influences of finance on productivity growth mainly in the developed economies, while such growth occurs in less developed economies through capital accumulation. Christopoulos and Tsionas (2004) investigated the long run relationship between financial depth and economic growth combining cross sectional and time series data for developing countries. They found a single equilibrium relationship among financial depth, growth and ancillary variables; and cointegrating relationship indicated unidirectional causality from financial depth to growth. Waqabaca (2004) examined the relationship between financial development and economic growth in the context of Fiji using time series data of 30 years and found a positive relationship between financial development and economic growth, with causation running predominantly from economic growth to financial development.

3. Data and Methodology

The widespread literature on financial development offered several proxies of the extent of financial activity and the measure that has been common in most studies in the ratio of the broad money stock (M2) to the nominal per capita GDP traditionally used as a financial deepening indicator. In this study six measures of financial development are retained: the ratio of narrow money to nominal per capita GDP (FDM1), the ratio of broad money to nominal per capita GDP (FDM2), the ratio of total deposit to nominal per capita GDP (FDM3), the ratio of private sector credit to nominal per capita GDP (FDM4), the ratio of total credit to nominal per capita GDP (FDM5), and the ratio of private sector credit to total domestic credit (FDM6). Real GDP per capita is used the indicator of economic growth. The annual data set is employed for the Sri Lankan economy for the period 1955 to 2005. The gross domestic products (GDP) current prices, GDP at 1966 constant prices, population, narrow money supply and broad money supply are available from Annual Report of Central Bank of Sri Lanka 2003 and 2005. Total domestic credit, banking deposit liabilities and private sector credits (claims on the private sector) are taken from various issues of International Financial Statistics (IFS).

Unit Root Test

To establish cointegration between economic and financial development variables we have to check, in a preliminary step, whether each series is integrated and has a unit root using Dickey Fuller tests (DF) and Augmented Dickey-Fuller tests (ADF). The different tests are achieved assuming the presence of a unit root (non-stationary variable) in the null hypothesis (H0) and a stationary variable in the alternative hypothesis (Ha). If the calculated statistic is higher than McKinnon's critical value then we do not reject H0 and

1 See De Gregorio and Guidotti (1995) for critical survey on this topic.
the considered variable is non stationary, if not, it is stationary. First, tests in levels and then in first differences were carried out. Each series started with the most flexible specification of the test equation that includes an intercept and a trend:

$$\Delta Z_t = \alpha_1 + \alpha_2 t + \gamma Z_{t-1} + \sum_{j=1}^{k} \beta_j \Delta Z_{t-j} + \epsilon_t$$

Where $\Delta$ is the first difference operator, $Z$ is the variable of interest, $\alpha_1$ represents the intercept term, $t$ is the time trend, $\Delta Z_j$s are the augmented terms, $k$ is the appropriate lag length of the augmented terms and $\epsilon_i$ is the white noise error term. The ADF test is essentially the test of significance of the coefficient $\gamma$ in the above equation. The DF test is performed without the augmented term. In order to select the lag length $k$, we start with a maximum lag of 6 and pare it down to the appropriate lag by examining the Akaike Information Criterion (AIC) and Schwarz Criterion (SC).

### Cointegration Tests

Once the tests of integration (that is unit root tests) are achieved then it is possible to implement tests of co-integration to check the existence of a stable long run relationship between financial development and growth. The tests of cointegration between financial development and growth are based on a vector autoregression (VAR) approach initiated by Johansen (1988).

According to Johansen (1988), a $p$-dimensional VAR of order $k$ can be specified as follows:

$$Z_t = \alpha + \Pi_1 Z_{t-1} + \Pi_2 Z_{t-2} + \ldots + \Pi_k Z_{t-k} + \epsilon_t$$

This expression can be rewritten as:

$$\Delta Z_t = \alpha + \sum_{i=1}^{k-1} \theta_i \Delta Z_{t-i} + \epsilon_t$$

Here $\Pi$ and $\theta$ are $p$-by-$p$ matrices of unknown parameters and $\epsilon$ is the white noise term.

Johansen and Juselius (1990) developed two likelihood ratio tests: the Maximum Eigen Value test, which evaluates the null hypothesis of $r$ cointegrating vectors against the alternative of $(r+1)$ cointegrating vectors and the Trace test, which evaluates the null hypothesis of, at most, $r$ cointegrating vectors versus the general null of $p$ cointegrating vectors. In the case of a bivariate VAR, the null hypotheses is that there is no cointegration between the variables and the alternative one is the existence of only one cointegrating vector.

If the variables are cointegrated we use an error correction model to test causality between financial development and growth since co-integration implies the existence of an error correction model (ECM).

The ECM corresponding to our situation is
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\[ \Delta EG_t = \delta_1 + \gamma_1 \Delta FD_{t-1} + \gamma_2 \Delta FD_{t-2} + \ldots + \gamma_{p-1} \Delta FD_{t-(p-1)} \]
\[ + \beta_1 \Delta EG_{t-1} + \beta_2 \Delta EG_{t-2} + \ldots + \beta_{p-1} \Delta EG_{t-(p-1)} + \alpha_1 EC_{t-1} + \epsilon_{t1} \]
\[ \Delta FD_t = \delta_2 + \lambda_1 \Delta FD_{t-1} + \lambda_2 \Delta FD_{t-2} + \ldots + \lambda_{p-1} \Delta FD_{t-(p-1)} \]
\[ + \theta_1 \Delta EG_{t-1} + \theta_2 \Delta EG_{t-2} + \ldots + \theta_{p-1} \Delta EG_{t-(p-1)} + \alpha_2 EC_{t-1} + \epsilon_{t2} \]

Where, EC is the error correction term, p is the order of the VAR, which translates into a lag of p-1 in the ECM. The coefficients \( \alpha_1 \) and \( \alpha_2 \) represent the speed of adjustment after the economic growth (or the financial development) deviates from the long run equilibrium in period \( t-1 \). In other words, it represents the long-run causal effect in relation to the long-run equilibrium relationship of the cointegrated processes. The coefficients of the lagged values, \( \gamma_j \)'s in the first of the two equations represent short-run effects of financial development on economic growth and \( \theta_j \)'s in the second equation represents short-run effects of economic growth on financial development. A test of joint significance of these lagged terms constitutes a short-run Granger causality test.

Causality based on first difference VAR's in the case of no cointegration is tested as specified below:

\[ \Delta EG_t = \delta_1 + \sum_{j=1}^{m} \beta_j \Delta EG_{t-j} + \sum_{j=1}^{n} \gamma_j \Delta FD_{t-j} + \epsilon_{t1} \]
\[ \Delta FD_t = \delta_2 + \sum_{j=1}^{n} \lambda_j \Delta FD_{t-j} + \sum_{j=1}^{m} \theta_j \Delta EG_{t-j} + \epsilon_{t2} \]

Again, a test of joint significance of these lagged terms (\( \gamma_j \) and \( \theta_j \)) constitutes a short-run Granger causality test.

4. Empirical Evidence for Sri Lanka

The results of the order of integration of each variable are summarized in table 1. Both unit root results suggest that all variables are not stationary in the levels and but are stationary in the first difference I (1) at the 5 percent level of significance.

Table 2 presents the cointegration results for financial development variables and economic growth using the Johansen Procedure. Maximum Eigen value and trace statistics show that there is one cointegrating vector between five of the six proxies for financial development variables per capita income at the 5 per cent level. In the case of FDM3 and ED, the maximum Eigen value and trace statistics, suggest that there is no cointegrating vector. Since most of the series are cointegrated, next step is to estimate the ECM model. The ECM contains the cointegration relation built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. We then explore the dynamic Granger causality in the ECM specification by running pair wise
Granger causality tests. After estimating the VECM and applying the relevant statistical test to identify the sources of causation, the results are presented in Table 3.

### Table 1: Tests of the order of integration of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tests with a constant</th>
<th>Tests with a constant and a trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DF</td>
<td>ADF</td>
</tr>
<tr>
<td>FDM1</td>
<td>-1.12</td>
<td>-0.94</td>
</tr>
<tr>
<td>FDM2</td>
<td>-1.21</td>
<td>-1.84</td>
</tr>
<tr>
<td>FDM3</td>
<td>-0.54</td>
<td>-1.17</td>
</tr>
<tr>
<td>FDM4</td>
<td>-1.59</td>
<td>-1.56</td>
</tr>
<tr>
<td>FDM5</td>
<td>-2.13</td>
<td>-1.66</td>
</tr>
<tr>
<td>FDM6</td>
<td>-2.56</td>
<td>-1.66</td>
</tr>
<tr>
<td>ED</td>
<td>-2.56</td>
<td>-2.22</td>
</tr>
</tbody>
</table>

### Critical Value

-2.92  
-3.50

<table>
<thead>
<tr>
<th>Differences</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FDM1</td>
<td>-5.54</td>
</tr>
<tr>
<td>FDM2</td>
<td>-5.07</td>
</tr>
<tr>
<td>FDM3</td>
<td>-5.50</td>
</tr>
<tr>
<td>FDM4</td>
<td>-7.08</td>
</tr>
<tr>
<td>FDM5</td>
<td>-7.77</td>
</tr>
<tr>
<td>FDM6</td>
<td>-8.11</td>
</tr>
<tr>
<td>ED</td>
<td>-4.97</td>
</tr>
</tbody>
</table>

### Critical Value

-2.92  
-3.50

### Table 2: Cointegration Tests using Johansen Procedure

<table>
<thead>
<tr>
<th>Variables</th>
<th>Max. Eigen</th>
<th>Trace Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDM1 and EG</td>
<td>15.32(14.88)</td>
<td>20.16(17.86)</td>
<td>Cointegrated</td>
</tr>
<tr>
<td>FDM2 and EG</td>
<td>29.95(19.22)</td>
<td>35.74(25.77)</td>
<td>Cointegrated</td>
</tr>
<tr>
<td>FDM3 and EG</td>
<td>13.58(14.88)</td>
<td>20.88(17.86)</td>
<td>Not cointegrated</td>
</tr>
<tr>
<td>FDM4 and EG</td>
<td>20.99(14.88)</td>
<td>27.70(17.86)</td>
<td>Cointegrated</td>
</tr>
<tr>
<td>FDM5 and EG</td>
<td>20.27(14.88)</td>
<td>25.86(17.86)</td>
<td>Cointegrated</td>
</tr>
<tr>
<td>FDM6 and EG</td>
<td>15.67(14.88)</td>
<td>28.88(17.86)</td>
<td>Cointegrated</td>
</tr>
</tbody>
</table>

### Table 3: Granger Causality Test using ECM

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG on FDM1</td>
<td>8.37(0.212)</td>
<td>FDM1 does not cause EG</td>
</tr>
<tr>
<td>FDM1 on EG</td>
<td>17.65(0.0007)</td>
<td>EG cause FDM1</td>
</tr>
<tr>
<td>EG on FDM2</td>
<td>14.09(0.029)</td>
<td>FDM2 cause EG</td>
</tr>
<tr>
<td>FDM2 on ED</td>
<td>24.36(0.0004)</td>
<td>EG cause FDM2</td>
</tr>
<tr>
<td>EG on FDM4</td>
<td>16.69(0.0088)</td>
<td>FDM4 cause EG</td>
</tr>
<tr>
<td>FGM4 on ED</td>
<td>1.95(0.92)</td>
<td>EG does not cause FDM4</td>
</tr>
<tr>
<td>EG on FDM5</td>
<td>6.27(0.39)</td>
<td>FDM5 does not cause EG</td>
</tr>
<tr>
<td>FDM5 on EG</td>
<td>15.39(0.021)</td>
<td>EG cause FDM5</td>
</tr>
<tr>
<td>EG on FDM6</td>
<td>4.70(0.58)</td>
<td>FDM6 does not cause EG</td>
</tr>
<tr>
<td>FDM6 on EG</td>
<td>15.89(0.01)</td>
<td>EG cause FDM6</td>
</tr>
</tbody>
</table>
Table 3 presents the results of the Granger Causality test using ECM procedures. The results show that FDM1 does not cause economic growth however economic growth cause FDM1 indicating one way causality. However, FDM2 Granger causes to economic growth. This is the only variable with bidirectional causality in our study. It may be due to the fast growing of broad money after economic reform. FDM4 Granger causes economic growth with one way causality. FDM5 and FDM6 do not cause economic growth, but these variables have one way causality running from economic growth to financial development variables. Most of the credit variables are growing faster in Sri Lanka because of the extension of credit flow, financial activities and banking reforms after the period of liberalisation in the late 1970s. This situation has not contributed to economic growth however economic growth has boosted these variables. In summary, the results of the study suggest that broad money and private sector credit contribute to economic growth while economic growth contributes to narrow money, total credit and private sector credit with unidirectional relationship. In the case of variables FDM3, the causality test was conducted using first difference VAR since there is no cointegration with FDM3 and EG. The results suggest that the null hypothesis EG does not Granger cause financial development was rejected at the 5 percent level of significance while financial development does not Granger cause economic growth was rejected.

5. Conclusions
This study investigates the relationship between financial development and economic growth using Sri Lankan data from 1955 to 2005. Six measurers of financial development were developed: the ratio of narrow money to nominal per capita GDP (FDM1), the ratio of broad money to nominal per capita GDP (FDM2), the ratio of total deposit to nominal per capita GDP (FDM3), the ratio of private sector credit to nominal per capita GDP (FDM4), the ratio of total credit to nominal per capita GDP (FDM5), and the ratio of private sector credit to total domestic credit (FDM6). Unit root tests were conducted using DF and ADF procedures for all the time series data, and Johansen procedure was used to tests the cointegration between economic growth and financial development. As most of the variables are cointegrated, the Granger Causality Test was performed using ECM procedure to investigate the causal relationship between financial development and economic growth. The findings suggest that broad money causes economic growth and there is two-way causality between broad money and economic growth. Private sector credit has contributed positively to economic growth and in this case causality runs from private sector credit to economic growth as one-way causality. One-way causality runs from economic growth to narrow money, total credit, and private sector credit to total domestic credit. The major findings of this study do not support the view that financial development boosts economic growth.

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