Finance - Growth Nexus : Evidence from Sri Lanka[1]

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Abstract

This study investigates the relationship between financial development and economic growth of Sri Lanka using time series data from 1960 to 2008. Cointegration and causality tests are conducted to assess the finance-growth link by taking saving, investment, trade and real interest rate into account. The empirical results show that economic growth causes financial development in the long-run and there is no reverse causation. This conclusion of the study goes in line with the views expressed by Demetriades and Hussein (1996), Macri and Sinha (2001) and Abma and Fase (2003) but departs distinctively from the observations made by Ahmed and Ansari (1998), on the finance-growth link in relation to Sri Lanka. The results of this research also show that the investment causes the economic growth which in turn results in demand for financial services to follow the growth in the real sector of the economy. This study has further identified that Sri Lanka's financial system has shown some weaknesses in performing its tasks which would have been instrumental in the determination of causality pattern between financial sector development and economic growth of the country.

1. Introduction

The early literature on economic growth at both the theoretical and empirical levels, focused on several key variables such as physical and human capital, productive investments,

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technology and fiscal and monetary policy stance as the sources of growth. However, some economists, particularly since 1970s, began to believe that a well developed, market oriented financial sector contributes to economic growth. Contemporary empirical and theoretical literature on the finance-growth nexus provides more insights into the potential role of financial sector in economic development. Much of this literature finds that a greater depth of financial sector development measured in terms per capita amount of financial services and institutions or the ratio of financial assets to GDP (financial deepening) is crucial for economic development. It is highly likely that many contemporary economists take this position for granted[2/]. Levine (1997), for instance, describes that a financial system is important in performing five basic tasks namely, (*i*). facilitating the trading, hedging, diversifying, and pooling of risk, (*ii*) allocating resources, (*iii*) monitoring managers and exerting corporate control, (*iv*) mobilizing savings, and (*v*) facilitating the exchange of goods and services.

Despite the fact that there is growing consensus among economists on the positive relationship between financial sector development and growth, there has been no consensus among them on causal relationship between these two variables. For instance, Kemal *et al*. (2007) identify four schools of thought on the finance-growth nexus, each of which views that finance promotes growth, hurts growth, follows growth or it does not matter for growth. Two competing hypothesis of interest are the possible causality running from finance to growth and growth to finance, labeled by Patrick (1996) as supply leading hypothesis and demand following hypothesis respectively. Supply leading hypothesis indicates that deliberate creation of financial institutions and markets increases real growth while the demand following hypothesis posits that economic growth creates demand for more financial services and as a result the financial systems will grow only in response to such economic expansions. The point of argument of the latter case is that increased economic activities will result in more demand for both physical and liquid capital. Therefore, the growth in the real sector induces the financial sector to expand, and thereby increases competition and efficiency of the financial intermediaries and markets.

In the above context, and considering the widened and deepened financial features of Sri Lanka's financial system particularly along with the liberalization of financial sector, this study attempts to ascertain whether financial development in Sri Lanka causes its economic growth or in contrast whether there exist any other causal relationships between these two areas of economic importance.

2/ World Bank (2001) data show that a financial depth indicator, asset capitalisation of financial system as a percentage of GDP of high income, upper middle income, lower middle income and low income countries was 155, 72, 58 and 32 respectively, during 1990s and this status-quo itself is very much supportive for economists to believe that financial development promotes economic growth.

The remainder of this study is organized as follows. Section 2 provides a theoretical and empirical literature review. An overview of the financial sector development in Sri Lanka is presented in section 3. Data and research methodology are explained in section 4. In section 5, the empirical results are presented and analyzed. Section 6 draws policy implications and concludes the paper.

2. Review of Theoretical and Empirical Literature

A large and diverse body of theoretical and empirical literature has investigated the relationship between financial sector development and economic growth. Much earlier work on this subject can even be traced as far back as to Bagehot (1873), who described how industrialization of England was facilitated by the availability of a large amount of money for "immense works". Earlier work also includes Schumpeter's (1932) study that goes to establish a view that a well functioning financial system would induce technological innovation by identifying, selecting and funding the entrepreneurs who would be expected to successfully implement their products and productive processes. However, in later years, growing acceptance of this one-way causality was questioned by some economists, asserting that financial development follows the development of an economy (demand following hypothesis) and not the vice versa. Robinson (1952) who has pioneered this view stresses the fact that *'where enterprise leads finance follows'*.

The views of McKinnon (1973) and Shaw (1973), which are referred to as the "McKinnon Shaw" hypothesis, received considerable attention as a leading theoretical presentation on positive effect of financial development on growth. According to this hypothesis, increased savings rate and thus the investment rate would raise size of savings and efficiency of investment leading to higher economic growth. In other words, a low or negative real interest rate discourages savings and reduces the availability of loanable funds for investment thereby lowering the rate of economic growth. The other essential tenet of this hypothesis is that any government restrictions on the banking system would impede the process of banking development and consequently, reduce economic growth. This implies that a more liberalized financial system induces an increase in savings and investment and thus, promotes economic growth. "McKinnon Shaw" hypothesis was popularized further by Fry (1988) and Pagano (1993). On the contrary, Lucas (1988), argues that financial factors can play a little role in the process of growth declaring that *'economists badly over-stress the role of financial factors in economic growth'*.

Table I provides an overview of some selected empirical studies which hold diverse views and conflicting predictions relating to finance-growth nexus.

Table I: Finance-Growth Nexus – An Overview of Selected Empirical Studies

Author(s) & Year	Financial Variables	Growth Variables	Control Variables/ Other Variables	Sample Period	Sample Coverage	Research Methodology
King & Levine (1993a)	Ratio of liquid liabilities of banks and non bank financial institutions to GDP Ratio of assets of commercial banks to assets of commercial banks plus central bank Ratio of private credit to total domestic credit Ratio of credit to non financial private sector to GDP	Real per capita GDP growth Rate of physical capital accumulation Ratio of domestic investment to GDP	Initial GDP School enrolment Literacy rate Innovation	1960 to 1989	About 80 developed and developing countries	Cross country regression analysis
Beck *et al*. (2000)	Ratio of private credit to GDP Ratio of liquid liabilities to GDP Ratio of credit by deposit banks to GDP	Real per capita GDP growth	Initial real per capita GDP Average years of schooling Inflation rate Ratio of govt. expenditure to GDP Exports and imports to GDP Black market premium to capture the degree of openness	1960 to 1995	About 70 developed and developing countries	Generalized method-of-moments (GMM) dynamic panel estimators and a cross-sectional instrumental variable estimator
Caldero´n & Liu (2003)	Ratio of broad money (M_2) to GDP Ratio of private credit to GDP	Real per capita GDP growth	Initial human capital Initial income level A measure of government size Black market exchange rate premium and regional dummies	1960 to 1994	109 developing and industrial countries	Panel analysis and Geweke decomposition test

Table I (Contd.)

Odedokun (1996)	Ratio of nominal value of the stock of liquid liabilities to the nominal annual GDP	Real GDP	Labour force Capital stock Ratio of investment to GDP Real export growth	Varying period that spans between 1960s to 1980s	71 developing and least developed countries	Regression equations for each country
Khan & Qayyum (2007)	Ratio of broad money to GDP Ratio of bank deposit liabilities to GDP Ratio of money cleared through clearing house to GDP Ratio of private sector credit to GDP Ratio of stock market capitalisation to GDP Ratio of currency in circulation to GDP A financial index has been constructed using Principal Component Analysis (PCA)	Real output	Real deposit rate Impact of trade liberalisation on real output	1961 to 2005	Pakistan	Bound testing approach to cointegration within the framework of Auto-regressive Distributed Lag (ARDL) developed by Pesaran, *et al.* (2001)
Jung (1986)	Ratio of currency to the narrow money (M_1) Ratio of broad money (M_2) to nominal GNP/ GDP	Real per capita GNP/ GDP	None	At least 15 annual observations	19 industrial countries, 31 developing and least developed countries	Regression analysis and Granger's simple causality tests
Demetriades & Hussein (1996)	Ratio of bank deposit liabilities to nominal GDP Ratio of private credit to nominal GDP	Real per capita GDP	None	At least 27 annual observations for each country	16 developing and developed countries	Cointegration tests using Engle and Granger (1987) and Johansen (1988) methods

Table I (Contd.)

Ahmed & Ansari (1998)	Ratio of broad money (M_2) to nominal GDP Ratio of quasi-money (time and savings deposits) to nominal GDP Ratio of domestic credit to nominal GDP	Real GDP and real per capita GDP	Ratio of investment to GDP Population	1973 to 1991	3 South-Asian economies, namely, India, Pakistan, and Sri Lanka.	The standard Granger causality tests and regression equations estimated using the Cobb-Douglas production function framework
Macri & Sinha (2001)	Growth rate of money supply as a ratio of nominal GDP Growth rate of quasi-money as a ratio of nominal GDP Growth rate of domestic credit as a ratio of nominal GDP Growth rate of real money supply Growth rate of real domestic credit Growth rate of real broad money	Growth rate of real GDP Growth rate of real per capita income	Growth rate of real investment as a ratio of GDP Growth rate of population	Different series generally covering 1950s to 1990s	8 Asian countries	Regression analysis and multivariate causality tests
Abma, & Fase, (2003)	Balance sheet totals of the banking sector	Growth rate of GDP	Growth rate of investment	Annual observations vary between 49 and 25	9 Asian countries	Granger causality test and regression analysis

Table I (Contd.)

Ang & McKibbin (2007)	Ratio of liquid liabilities of the financial system (M_3) to GDP Ratio of commercial bank assets to commercial bank assets plus central bank assets Ratio of private sector credit (domestic) to nominal GDP A financial index has been constructed using PCA	Real per capita GDP	Ratio of gross domestic savings to nominal GDP Ratio of gross investment to nominal GDP Real interest rate Ratio of exports and imports to nominal GDP	1960 to 2001	Malaysia	Vector Auto-regressive (VAR) approach and cointegration tests
Liang & Teng (2005)	Ratio of domestic credit by banking institutions to GDP Ratio of total deposit liabilities of banking institutions to GDP	Real per capita GDP	Real interest rate	1952 to 2001	China	VAR approach
Kemal *et al.* (2007)	Six measures for financial sector development	Real per capita GDP	Initial stock of physical capital Initial stock of human capital Inflation rate Government consumption to GDP International trade openness	1970s to 2001 covering a minimum of 21 observations	19 high income countries	Methodology of Nair-Reichert and Weinhold (2001) for causality analysis in heterogeneous panel data

Note: The definitions for M_1, M_2 and M_3 are the same as those used by the *International Financial Statistics* of the IMF.

King and Levine (1993a), Beck *et al*. (2000), Caldero'n and Liu (2003), Odedokun (1996), Khan and Qayyum (1998) and Ahmed and Ansari (1998) described in the Table I have concluded that financial development promotes growth. Demetriades and Hussein (1996) have found only little support to the view that finance is a leading sector in the process of economic development. They believe that King and Levine findings are difficult to interpret in a causal sense, assert that such findings are useful only in understanding contemporaneous correlation between growth and financial development, and also highlight the fact that cross section nature of the techniques cannot capture the country specific causality patterns. Having adopted a methodology of Nair-Reichert and Weinhold (2001) for causality analysis in heterogeneous panel data, Kemal et al.(2007), indicate that finance does not matter in economic growth, supporting the view of Lucas (1998) on the finance-growth nexus.

The study by Jung (1986), based on data for 56 countries of which 19 are industrial economies, has found evidence for equal probability of causal relationship for both financial development to growth and growth to financial development. Jung (1986) study has however restricted to only 15 annual observations in some cases and used causality test under VAR framework in their levels raising some doubts over the validity of the results[3/]. His findings also contradict with Patrick's (1966) view which predicts the demand following hypothesis for the developed countries and the supply leading hypothesis for the least developed countries (LDCs). Caldero´n and Liu (2002), using pooled data of 109 developing and industrial countries from 1960 to 1994, find that financial deepening contributes more to the causal relationships in the developing countries than in the industrial countries to economic growth. However, these findings are contrary to those of Demetriades and Hussein (1996) who have produced their results after conducting cointegrated causality tests under the Error Correction Mechanism (ECM) representation.

It is appropriate to present some of the findings that have been arrived at in some individual country studies relating to finance-growth nexus analyses. Ang and McKibbin (2007), using time series data on Malaysia for the period of 1960-2001 show that economic growth causes financial development in Malaysia and that there is no feedback relationship. Ahmed and Ansari (1995) investigated the "McKinnon Shaw" hypothesis for Bangladesh and found some, although weak, support for their hypothesis while Khan and Hasan (1998) in their study involving Pakistan found strong support for the "McKinnon Shaw" hypothesis. Liang and Teng (2006), investigate the relationship between financial development and economic growth for the case of China over the period of 1952–2001 and their empirical results suggest that there exists a unidirectional causality from economic growth to financial development in china.

3/ Causality tests are valid when variables are stationary or they are cointegrated.

There are a couple of multi-country empirical studies where Sri Lanka has been included among other selected countries to analyze the causality relationship between financial development and economic growth. Demetriades and Hussein (1996) show that, Sri Lanka's economic growth causes financial development and to a lesser extent, financial development leads to its economic growth. Macri and Sinha (2001), using multivariate causality tests on first differenced variables which are stationary, suggest that there is hardly any evidence of causality between financial development and economic growth in any direction for Sri Lanka. Ahmed and Ansari (1998), have found that financial development causes economic growth in Sri Lanka, but they have conducted causality tests using variables in their levels. The methodology adopted by Macri and Sinha (2001) has addressed this issue before conducting causality tests. Abma and Fase (2003) have investigated how the financial intermediation matters for growth for 9 selected Asian countries using Granger causality test and regression analysis. They have found non-significant relationship between finance and growth for Sri Lanka.

The present study examines the heterogeneity of country specific variables extensively and follows a methodology similar to that of Ang and McKibbin (2007) who have performed an ECM based causality tests for their study.

3. Overview of Financial Sector Development in Sri Lanka (1960-2008)

3.1 Structure and Asset Composition

A financial system comprises financial institutions (FIs) and financial markets as well as financial instruments and financial infrastructure consisting of the payments and settlement systems and the legal framework. The contemporary financial system of Sri Lanka comprises of all these aspects. The financial widening (expansion of financial services and growth of financial institutions) and financial deepening in Sri Lanka have improved with the gradual evolving of financial sector comprising particularly the financial institutions and agents, regulations, transactions, financial instruments and market practices.

The formal financial sector institutions in Sri Lanka can be broadly classified into two groups, namely, the financial institutions regulated by the Central Bank of Sri Lanka (CBSL) and financial institutions/entities not regulated by the CBSL. The former group encompasses licensed commercial banks, licensed specialized banks, registered finance companies and other institutions such as Employees' Provident Fund (EPF) while the latter group constitutes deposit taking institutions, contractual savings institutions and other specialized financial entities.

The commercial banks dominate in terms of assets of the financial sector and the provision of financial services to the public. As shown in the Table II, there are a variety of other institutions engaged in catering to various financial needs of the people. Considering the fact that the commercial banks have been active in virtually all aspects of financial needs of the people, there is a greater need of analyzing how these banks contribute to the economic growth of the country.

Table II: Assets of Financial Sector Institutions as at End 2008

Financial Institution	Assets (Rs.Bn.)	As a % of Total Financial Assets	As a % of GDP
Central Bank of Sri Lanka (CBSL)	**598.4**	**12.49**	**13.57**
Institutions Regulated by the CBSL	**3,741.2**	**78.07**	**84.82**
Deposit-taking institutions	2,889.8	60.30	65.52
Licensed commercial banks	2,277.0	47.52	51.63
Licensed specialized banks	437.2	9.12	9.91
Registered finance companies	175.6	3.66	3.98
Other financial institutions	851.4	17.77	19.30
Employees' Provident Fund (EPF)	655.3	13.67	14.86
Primary dealers	86.2	1.80	1.95
Specialized leasing companies	109.9	2.29	2.49
Institutions not Regulated by the CBSL	**452.5**	**9.44**	**10.26**
Deposit-taking institutions	44.5	0.93	1.01
Co-operative rural banks	39.3	0.82	0.89
Thrift and credit cooperative societies	5.2	0.11	0.12
Contractual savings institutions	374.9	7.82	8.50
Employees Trust Fund	92.4	1.93	2.09
Private provident funds	108.0	2.25	2.45
Insurance companies	155.1	3.24	3.52
Public Service Provident Fund	19.4	0.40	0.44
Other specialized financial institutions	33.1	0.69	0.75
Venture capital companies	1.1	0.02	0.02
Unit trusts	6.8	0.14	0.15
Stock broking companies	3.2	0.07	0.08
Credit rating agencies	0.1	0.00	0.00
Other	21.9	0.46	0.50
Total Assets	**4,792.1**	**100.00**	**108.65**

Source : Central Bank of Sri Lanka

3.2 Salient Features of Evolution of the Financial System

At the time of establishment of CBSL in 1950, the financial system of the country had not developed systematically. There were 10 foreign commercial banks, operated through their branch offices accounting for nearly 60 per cent of total assets and 2 domestic banks, accounting for the rest of assets. The banking density[4/] was very low (0.0365) implying that one bank branch had to reach as many as 275,000 people. Nearly, 90 per cent of the advances was in the form overdrafts and a large part of deposits was invested abroad. Non-bank financial institutions such as savings banks and long-term lending institutions were virtually absent during this time. This is a reflection of the non-existence of diversified economic activities due to low expansion of the economy and the limited requirements for banking needs of the people. At the beginning of 1950s, activities of two domestic banks were also largely limited to urban areas and they were mostly financing the short-term trading activities including export and import trade.

There was an increase in demand for financial services starting from 1960s. During the 1960s and 1970s, an emphasis was given by the government to increase presence of domestic banks in the country and expand the financial institutions into remote areas. With the entry of People's Bank in 1961, two state banks were called upon to promote development banking, particularly for financing agriculture and industry. The two state banks expanded their activities rapidly with the government support, gradually getting their dominance in the banking sector over expatriate banks which mainly met the financial requirements of the foreign trade sector and the working capital requirements of the plantation sector. Direct government intervention over economic activity gave no room for private sector involvement in financial activities during this time. Under a policy package that consists of administrative controls, regulations and restrictions, foreign banks functioned at a low key while two state banks flourished possessing over 60 per cent of total assets of the banking sector. By 1970, two state banks accounted for 71 per cent of total deposits and 72 per cent of advances of the commercial banks of the country.

Sri Lanka saw a complete turnaround in the country's economic policy beginning 1977 with the introduction of a market-oriented policy package replacing government control over many economic activities. The liberalised economic policies adopted, necessitated commensurate changes in the financial system for which a series of financial sector reform programmes was also introduced after 1977. During the period of 77–83, a total of 14 new branches of foreign banks were established with two representative offices in the country. Banking density increased to 0.4230 by 1989 with each branch requiring to serve only 23,600 people. Interest rate and exchange rate controls were relaxed to some extent and new financial instruments came into existence. Technological and other changes were

4/ (No. of bank offices*10,000) / Total population

effective in reducing the cost of financial intermediation. There was a strengthening of the legal, accounting and regulatory frameworks of financial institutions for improving financial sector management.

A liberal regime for establishing new institutions facilitated the private sector to create new special financial institutions, including finance companies, merchant banks, leasing companies, unit trusts and foreign currency banking units. Financial markets representing money, foreign exchange and capital markets were allowed to introduce new financial instruments and services in line with the emerging financial requirements of the economy and technological developments. By 2008, there were 22 commercial banks (11 locally incorporated banks and 11 branches of foreign banks), 14 licensed specialized banks and 34 registered finance companies operating in the country. Today, the banks are active in virtually all aspects of financial services, with some of them having subsidiaries or affiliates engaged in insurance and capital markets activities.

3.3 Behaviour of Selected Financial Variables (1960–2008)

Table III indicates that assets of CBSL and commercial banks in relation to total assets of the financial system has been decreasing over the years. A substantial part of this change is accounted for by the increase in asset base of the EPF and National Savings Bank (NSB).

Table III: Assets of the CBSL and Commercial Banks

Year	Assets of CBSL (Rs. Bn.)	Assets of Cbks (Rs. Bn.)	Total Assets of CBSL plus Cbks (Rs. Bn.)	Total Assets of All Financial Institutions (Rs. Bn.)	Assets of CBSL plus Cbks as a % of Total Assets	Assets of CBSL plus Cbks as a % of GDP
1960	1.2	1.1	2.3	2.9	77.4	34.0
1965	2.1	1.6	3.7	5.1	73.2	45.6
1970	3.1	2.7	5.8	8.8	66.7	42.8
1975	4.4	4.4	8.8	12.7	69.5	33.1
1980	26.4	22.2	48.6	67.7	71.7	72.9
1985	52.2	54.9	107.1	171.9	62.3	65.9
1990	71.6	115.9	187.5	357.7	52.4	58.2
1995	165.7	328.6	494.3	880.3	56.2	74.0
2000	209.1	597.9	807.0	1,459.3	55.3	64.2
2005	435.2	1,257.1	1,692.3	2,979.4	56.8	69.0
2006	490.1	1,536.3	2,026.4	3,462.0	58.5	69.0
2007	559.6	1,822.4	2,382.0	4,311.2	55.3	66.6
2008	585.5	1,963.1	2,548.6	4,790.4	53.2	57.8

Note: Cbks = Commercial Banks

Source: International Financial Statistics and Author's Calculation.

The increase in assets of other institutions such as insurance companies and finance companies have also contributed for this change. The pace of increase in financial assets in financial intuitions other than commercial banks has been high, but the point of interest is that how such assets have been instrumental in contributing for economic growth of the country. By looking at the percentage of assets of CBSL and commercial banks to GDP, which has shown an increasing trend over the period of 1960 to 2008, it can be deduced that rate of increase in GDP, the denominator of the ratio is slower than the rate of increase of numerator variable. Owing to this phenomena, this study considers it's appropriate to take commercial bank assets into account in analyzing the efficiency of the financial sector.

Table IV presents a summary view on three measures of financial development used in this research for the computation of one proxy indicator of financial development, adopting PCA. Private sector credit by commercial banks to nominal GDP as a percentage has shown an increasing trend, with the lowest of 7.3 per cent reported in 1960 and the highest of 34.0 per cent reported in 2006. However, the M_2 as a percentage of nominal GDP has fluctuated between 18.0 per cent and 33.8 per cent during the period of 1960 to 2008. The increase of assets of commercial banks as a percentage of assets of commercial banks plus CBSL, from 48.4 per cent in 1960 to 77.3 in 2008, is remarkable.

Table IV: Selected Financial Variables

Year	Credit to Private Sector (Rs. Bn.)	Broad Money (M_2) (Rs. Bn.)	Credit as a % of GDP	M_2 as a % of GDP	Assets of Cbks to Assets of CBSL plus Cbks
1960	0.5	1.6	7.3	23.5	48.4
1965	0.7	2.3	9.2	28.2	43.6
1970	1.6	3.1	11.7	22.8	45.9
1975	3.4	4.8	12.7	18.0	49.8
1980	11.4	19.9	17.2	29.9	45.6
1985	33.6	48.4	20.7	29.8	51.3
1990	63.1	90.5	19.6	28.1	61.8
1995	207.5	228.5	31.1	34.2	66.5
2000	362.6	404.7	28.8	32.2	74.1
2005	806.9	822.9	32.9	33.6	74.3
2006	998.3	993.2	34.0	33.8	75.8
2007	1,190.1	1,147.7	33.3	32.1	76.5
2008	1,276.6	1,282.2	28.9	29.1	77.3

Note: Cbks = Commercial Banks

Source: International Financial Statistics and Author's Calculation.

3.4 Factors Affecting the Efficiency of Financial Sector in Sri Lanka

The financial sector growth may be analysed in terms of its capability in mitigating risks and transactions costs, and mobilizing and allocating resources efficiently within the economy, among other things in measuring financial sector contribution to the economic performance. In light of this, it is necessary to assess country-specific issues relating to the development of financial sector, which is measured in terms of financial variables discussed in Table III and Table IV.

In general, from 1960 to 1977, Sri Lanka did not witness any attempt by the concerned authorities to maintain a competitive environment in the financial sector, making it difficult for commercial banks to perform financial intermediation efficiently. Continued intervention by the government in economic matters also allowed no impetus for financial sector growth. In the absence of intensive private sector involvement in financial sector, two state banks dominated and survived along with some other weaker banks at the expense of financial system efficiency.

Since from 1977 to date the country's financial sector has undergone considerable changes in its structure and performance but there are issues which are related to efficient performance of financial sector. For instance, two state owned banks continued to concentrate on their lending to the government sector. Exposure of these banks in their total loan portfolio to government and state-owned enterprises such as Ceylon Petroleum Corporation and Ceylon Electricity Board increased as high as 50 per cent at sometimes after 1977, and remained over 30 per cent in many years. The gravity of this problem in economic development is obvious as two state banks represent nearly 60 per cent of total advances of the country while the credit to several large public corporations by these banks has to be accommodated with less attention being paid to prudential lending policy. Further, the oligopolistic nature of Sri Lanka's commercial banking system, in which two state banks dominate the business, militates against smooth functioning of financial markets in the country.

Sri Lanka's money market is still narrow and the spectrum of available instruments is limited. A long-term corporate bond market is virtually missing in the country. If the development of financial institutions and financial instruments is driven by economic progress, any factor that determines the economic progress is to be blamed for the low progress in the financial sector. Hence, steps needed to develop the long-term bond market may lie with some other complementary factors such as political stability, investor friendly atmosphere, and fiscal sector efficiency which are necessary conditions for economy to perform well, among other things. For instance, the expansionary pressure exerted on the money supply by the need to finance large government deficits (Government borrowing from the market at the expense of crowding-out effect and the government making use of

virtually all money held by Employees Provident Fund (EPF) would also have diminished the overall efficiency in resource allocation in the economy) and the political instability prevailed until recently would have caused adverse impact on overall efficiency of financial sector resulting in poor expansion in corporate bond and debt markets in the country. Such structural weaknesses provide no room for financial intermediaries to exert a significant control on firms through their actions.

The high cost of borrowings to entrepreneurs remains a crucial factor that determine the magnitude of investment in the country. The spread between deposit and lending rates has been high by any international standards and weaker banks continue to perform and exist, passing substantial part of their operating expenses to the borrowers in terms of interest rate charges. Through the expansion of a range of financial instruments and use of technology in providing financial services to general public, the commercial banks in Sri Lanka could be geared to function viably while maintaining a lower spread between deposit and lending rates for the benefit of both the savers and the borrowers.

4. Data and Methodology

4.1 Data Source

Data for this research were collected from the *International Financial Statistics* (2009) of the International Monetary Fund, *World Development Indicators* (2009) of the World Bank and *Annual Reports* of the Central Bank of Sri Lanka. Annual data covering the period of 1960–2008 were used in the study.

4.2 Measuring Financial Development

The review of literature in section 2 (Table I) indicates that economists have been adopting various indicators capable of describing different aspects of the development of a financial system. The selection of measures of financial development for this study is based on those indicators reviewed in section 2.

It appears that monetary aggregates such as M_2 and M_3 as a ratio of nominal GDP, have been widely used in measuring financial deepening. This is because liquid liabilities of financial intermediaries, such as currency, demand deposits, savings and time deposits of commercial banks and savings of other financial institutions measured against GDP (nominal) provide some indication of the overall size of the financial intermediaries of a financial system. This study uses the logarithmic ratio of M_2 to nominal GDP (M) as one

of the proxy for measuring financial development but ignores M_3 as a ratio to nominal GDP considering the inadequacy of data points and the types of financial assets added to construct M_3.

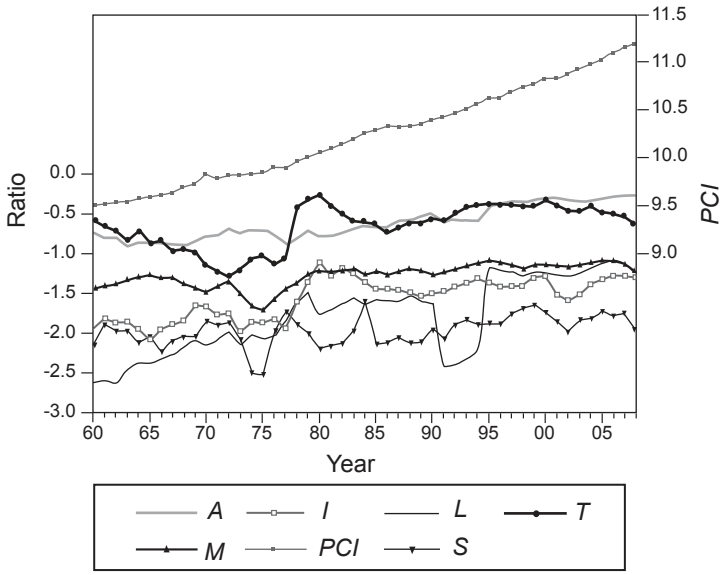
The logarithmic ratio of private sector credit by financial intermediaries to nominal GDP (*L*) is used as a second proxy in measuring financial sector development. When financial deepening is measured, it is necessary to observe the ability of financial intermediaries in reducing information and transaction cost and assisting market participants to take risks while channeling savings to productive purposes in an efficient manner. Commercial banks credit to private sector reflects a better view in measuring these aspects. Exclusion of credit to the public sector is necessary in measuring efficient resource allocation, considering the fact that public sector loans have been granted with less attention being paid to prudential lending requirements of banks. (see Demetriades and Hussein, 1996 and Ang and McKibbin, 2007).

The third measure used in this study is the logarithmic ratio of commercial bank assets to the sum of assets of both commercial banks and the Central Bank (*A*). This measure has been widely used in the literature, after it was first introduced by King and Levine (1993). This indicator is useful in measuring the relative importance of commercial banks involvement in developing the financial sector. Further, it represents the degree to which commercial banks allocate resources of the economy in comparison with that of the Central Bank. The usual intuitive judgment behind this measure is that commercial banks are efficient in resource allocation through its ability to identify risks of the projects, monitor mangers, and fund only viable ventures whereas the Central Bank role usually differs from that of the commercial banks.

4.2.1 Constructing an Index of Financial Development

Each of the financial variables selected has its own merits and demerits and provide some support in measuring various aspects of financial development. However, more often these financial indicators are complement to each other rather than substitutes. If a high correlation exists among the three variables, it might imply the presence of some form of causality among them. A single index of financial development is thus preferred and this index resolves the problem of multi-collinearity and the over-parameterization problem likely to occur under VAR framework satisfactorily. The PCA which is adopted to reduce a large set of correlated variables into a few number of uncorrelated variables can be employed for this purpose. This study therefore, examines correlation of key variables before the application of PCA to construct a single composite index which will reflect financial development of Sri Lanka.

Figure I : Behaviour of Key Variables



Note:

A = logarithmic ratio of commercial bank assets to commercial bank assets plus central bank assets

M = logarithmic ratio of liquid liabilities (M_2) to nominal GDP

L = logarithmic ratio of private sector credit to nominal GDP

PCI = logarithm of per capita real GDP

T = logarithmic ratio of exports and imports to nominal GDP

I = logarithmic ratio of gross investment to nominal GDP

S = logarithmic ratio of gross domestic savings to nominal GDP

Figure I shows the pattern of changes in *PCI* and other key variables in logarithmic form over the period of 1960-2008.

The correlation matrix[5/] given in Table V shows that three financial proxies are substantially correlated. This correlation justifies the adoption of PCA to construct a single composite index for three financial proxies to represent financial development in the

5/ logarithm of real per capita GDP (*PCI*) has a significant correlation with three financial proxies, *A, L* and *M*. In particular, logarithmic ratio of the assets of commercial banks to assets of both Central Bank and the commercial banks (*A*) has a very high correlation with *PCI*. However, the correlation does not reveal exact nature of causality present in underlying variables.

country. Accordingly, a new financial development proxy, denoted as *F* is created using PCA of which details appear in the Table VI.

Table V : Correlation Matrix

	A	*L*	*M*	*PCI*	*I*	*S*	*T*
A	1.000000						
L	0.786997	1.000000					
M	0.637232	0.587258	1.000000				
PCI	0.942178	0.821362	0.725570	1.000000			
I	0.610998	0.680681	0.720535	0.747020	1.000000		
S	0.493398	0.411824	0.529580	0.502866	0.351711	1.000000	
T	0.575686	0.516685	0.770674	0.621272	0.740048	0.320622	1.000000

Note : See Note under Figure I for the definition of Acronyms

Table VI : Principal Component Analysis for a Financial Depth Index

Eigenvalues: (Sum = 3, Average = 1)

PCA	Value	Cumulative Value	Proportion	Cumulative Proportion
1	2.344737	2.344737	0.7816	0.7816
2	0.446213	2.790950	0.1487	0.9303
3	0.209050	3.000000	0.0697	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3
A	0.600775	-0.291242	-0.744479
L	0.588080	-0.469816	0.658358
M	0.541509	0.833338	0.110980

Table VI summarises the results obtained from the PCA. The eigenvalues and eigenvector loadings are presented for 3 principal components. The eigenvlaue of the 1st principal component explains about 78 per cent of the standard variance while the 2nd principal component explains another 15 per cent. The 1st principal component which

captures most of the information, and explains the variations of the dependent variable better than any other linear combination of explanatory variables, can be selected as the best measure of financial development of Sri Lanka. The linear combination of three proxies of financial development will be multiplied by the loadings relating to 1st principal component to arrive at the new series. The relative weights used for *A, L* and *M* were 34.7 per cent, 34.0 per cent and 31.3 per cent respectively.

4.3 The Model and Econometric Methodology

The relationship of financial depth and growth nexus can be presented in following model.

$$F = f(PCI, Z) \quad \ldots\ldots\ldots (1)$$

where *F* refers to the composite index of financial development and *PCI* is logarithm of real per capita GDP. *Z* is a conditioning variable which is used to avoid specification bias of the model. According to theoretical considerations and empirical studies, a few variables which can be used as possible candidates for *Z* are the ratio of gross domestic savings to nominal GDP (*S*), ratio of gross investment to nominal GDP (*I*), real interest rate (*R*) and ratio of exports and imports to nominal GDP (*T*), all represented in logarithmic values except (*R*).

This study employs econometric techniques called VAR and constructs a 3-variable VAR model for estimation purpose. The VAR is a framework used for modelling multivariate relationships. Its variables called endogenous variables (*k*), are described as a linear function of only their past evolution for a given sample period ($t = 1, ..., T$). This approach helps to view finance-growth relationship both as a dynamic manner and as an autoregressive process. With the inclusion of lagged values of the endogenous variables, it is expected to eliminate the bias associated with simultaneity and serial correlation.

The VAR models with control variables of *S, I, T* and *R* will be constructed initially, as a first step towards the analysis of causal relationship between the financial development and growth. This approach would be extended to the employment of Vector Error Correction Mechanism (VECM), if the variables in the underlying regressions are found to be cointegrated.

4.3.1 Testing for Unit Roots

It is important to observe whether the data variables are stationary before application of standard estimation procedure in a dynamic time series model. This is because, regressing

a nonstationary variable Y_t upon another nonstationary variable X_t may lead to a so-called spurious regression, in which estimators and test statistics are misleading. Augmented Dickey Fuller (ADF) and Phillips–Perron (PP) tests are used to examine the presence of unit roots in the data series. The ADF test is employed for the regression in following form

$$\Delta Y_t = \alpha_1 + \alpha_2 t + \Theta Y_{t-1} + \gamma_i \sum_{i=1}^{m} \Delta Y_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots (2)$$

where, ΔY_{t-1} is the number of lagged difference terms (m) to include in the regression so that error term in equation (2) would be serially independent. α_1 is the drift coefficient while t represents the deterministic trend. ε_t represents a sequence of uncorrelated stationary error terms with zero mean and constant variance. The ADF test suggests that a time series has a unit root if Θ is not significantly different from zero, and it is stationary if Θ is significantly different from zero ($\Theta < 0$). The PP test built on (2) where $\gamma = 0$, makes a non-parametric correction to the t-test statistics. The PP unit root tests are robust to serial correlation and time dependent heteroskedasticity.

4.3.2 Testing for Cointegration

Data series will be tested for cointegration if the nonstationarity is found in each data series by the unit root tests. The presence of cointegration is tested using Johansen (1988) maximum likelihood procedure.

The VAR(P) model for a k-dimensional vector Y_t can be reformulated into a Vector Error Correction (VEC) form as follows.

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{j=1}^{k-1} \Gamma_j \Delta Y_{t-j} + \delta_0 + \varepsilon_t, \ \varepsilon_t \text{ is } NID\ (0, \Sigma) \quad \ldots\ldots\ldots (3)$$

Where

$\Pi = \sum_{j=1}^{k} \Theta_j - I$, I is the identity matrix

$\Gamma_j = -\sum_{i=j+1}^{k} \Theta_i$ and

$\Delta Y_t = Y_t - Y_{t-1}$, Δ is the differencing operator

The rank of Π in equation (3) is equal to the number of cointegrating vectors (r). Two types of tests are employed to determine r;

$H_0 : r \leq r_0$ versus the alternative $H_1 : r_0 < r \leq k$ can be tested using the statistic

$\lambda_{trace}(r_0) = -T \sum_{j=r_0+1}^{k} ln(1 - \hat{\lambda}_j)$. This is the so-called trace test. It checks whether the smallest k- r_0 eigenvalues are significantly different from zero. Furthermore, we can test $H_0 : r \leq r_0$ versus the more restrictive alternative $H_1 : r_0+1$ using the statistic

$\lambda_{max}(r_0 \leq r_0+1) = -T \ ln(1- \hat{\lambda}_{r_0+1})$. This is called the maximum eigenvalue test as it tests whether the estimated $(r_0+1)^{th}$ largest eignevalue is significantly different from zero.

Further, if the cointegrating relationship is found, it could be concluded that there is some long-term relationship among the variables of the data series. If variables are linked by some long-run relationship, from which they may deviate in the short-run but will return to the long-run relationship, residuals will be stationary. Conversely, when variables diverge without bound there will be nonstationary residuals with no equilibrium relationship.

4.3.3 Error Correction Mechanism (ECM)

According to Engle and Granger (1987), if the variables in a regression are cointegrated, then there exists a valid error-correction representation of the data. As stated earlier, a set of data variables that are cointegrated, has a long-run equilibrium relationship but there is a need to correct the short-run disequilibrium that may exist between the variables in order to maintain consistency with the long-run equilibrium. This long-run equilibrium corresponds to a steady state growth path.

Matrix Π in equation (3) which has rank r can be decomposed as $\alpha\beta'$.

Thus $\Pi = \alpha\beta'$ where α is a (nxr) matrix and implies the speed of adjustments towards the long-run equilibrium when there are short-run deviations from its equilibrium (where a larger α suggests a faster convergence towards the long-run equilibrium). β' is a (nxr)' matrix of cointegrating vectors that include the long-run coefficients in the VECM.

For example, when $r = 1$ and $n = 3$, α and β take the form

$$\alpha = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \end{bmatrix} \text{ and } \quad \beta' = (\beta_{11} \ \beta_{21} \ \beta_{31})$$

This study is a 3-variable case and the VECM with one cointegarated relationship could be written as follows.

$$\nabla F_t = \mu_1 + \alpha_{11} ECT_{t-1} + \sum_{j=1}^{p-1} A_{1j} \nabla F_{t-j} + \sum_{j=1}^{p-1} A_{1j} \nabla PCI_{t-j} + \sum_{j=1}^{p-1} \Psi_{1j} \nabla Z_{t-j} + \varepsilon_{1t}$$

$$\nabla PCI_t = \mu_2 + \alpha_{21} ECT_{t-1} + \sum_{j=1}^{p-1} A_{2j} \nabla F_{t-j} + \sum_{j=1}^{p-1} A_{2j} \nabla PCI_{t-j} + \sum_{j=1}^{p-1} \Psi_{2j} \nabla Z_{t-j} + \varepsilon_{2t}$$

$$\nabla Z_t = \mu_3 + \alpha_{31} ECT_{t-1} + \sum_{j=1}^{p-1} A_{3j} \nabla F_{t-j} + \sum_{j=1}^{p-1} A_{3j} \nabla PCI_{t-j} + \sum_{j=1}^{p-1} \Psi_{3j} \nabla Z_{t-j} + \varepsilon_{3t}$$

Where *Z* is the conditioning variables (*S, I, T* or *R*), ε_t *'s* are Gaussian residuals and

$ECT_{t-1} = F_{t-1} + (\beta_{21} / \beta_{11}) PCI_{t-1} + (\beta_{31} / \beta_{11}) Z_{t-1}$ is the normalized equation.

From the above equations, two sources of causation can be found *i.e.*, through the *ECT,* if $\alpha \neq 0$, or through the lagged dynamic terms. The *ECT* measures the long-run equilibrium relationship while the coefficients on lagged difference terms indicate the short-run dynamics. The statistical significance of the coefficients relevant to *ECT* provides evidence of an error correction mechanism that drives the variables back to their long-run relationship. The VECM approach would be useful in finding the direction of causality among variables and distinguishing between the short-run and long-run of such causality. All the variables in the VECM are considered endogenous and thus clears the problem of endogeneity as well.

5. Empirical Results

5.1 Unit Root Tests

Table VII shows the results of the ADF and PP tests for variables, *F, I, S, T* and *PCI* and the first differences of these variables.

Table VII : ADF and PP Unit Root Tests

Variable	Augmented Dickey Fuller		Phillips-Perron	
	τ_μ	τ_t	τ_μ	τ_t
F	-1.179229	-2.580963	-1.153051	-3.221846
I	-1.952500	-2.024272	-1.867447	-2.680222
S	-2.505500	-2.992211	-2.822737	-2.278126
T	-1.781905	-1.781905	-1.742635	-2.471992
R	-2.259286	-2.155820	-2.340276	-2.294414
PCI	1.747088	-1.425336	2.358265	-1.473550
ΔF	-4.619103*	-4.545473*	-6.262118*	-6.184895*
ΔI	-4.517948*	-4.467295*	-6.348521*	-6.277036*
ΔS	-5.934634*	-5.858460*	-6.936366*	-6.856128*
ΔT	-4.090368*	-4.004910	-5.592769*	-5.517829*
ΔR	-6.234788*	-6.287012*	-10.020470*	-9.998190*
ΔPCI	-2.861208**	-3.566524**	-7.261605*	-8.046042*

Note: Test results are reported from the ordinary least square estimation of the autoregression, as described under the section 4.3.1. τ_μ, is the *t* statistic for testing the significance of Θ when time trend is not included while τ_t is the *t* statistic for testing Θ when time trend is included in the equation. Δ denotes the first difference of each variable. Number of lags was selected using the *Akaike's Information Criterion* (AIC). (*) and (**) signify rejection of the unit root hypothesis at the 1% and 5% significance levels, respectively.

ADF and PP test statistics suggest that all variables have unit roots at 05 per cent significance level. All differenced terms of these variables are stationary at 05 per cent significance level, suggesting that these variables in levels are integrated of order one, I(1) {*i.e*., the first differences of all variables are integrated of order zero, I(0)}.

5.2 Evidence from Cointegration and Causality Tests

Having observed that all nonstationary variables in their levels become stationary in first difference, the next step of this analysis involves the employment of a test (Johansen approach) to see whether there is any cointegrating relationship among these variables. Before application of the Johansen approach, the optimal lag length (p) of each model was selected by a series of nested likelihood ratio tests conducted on first-differenced VARs. Table VIII reports the results of Johansen's multivariate cointegration test based on the Trace test and maximum Eigenvalue test.

Table VIII: Johansen Cointegration Tests

Model	Trace Statistics (λ_{trace})			Maximum Eigenvalue Statistics			Lags (p)
	Hypothesized No. of Cointegrating Equations			Hypothesized No. of Cointegrating Equations			
	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$	
A: (*F,PCI,I*)	34.13499*	14.23707	3.027333	29.89792*	11.20974	3.027333	2
B: (*F,PCI,S*)	42.70001*	13.89286	2.765998	24.80715*	14.12686	2.765998	2
C: (*F,PCI,T*)	37.39478*	13.29097	3.469936	24.10381*	9.821039	3.469936	2
D: (*F,PCI,R*)	28.38270	9.628151	1.972416	18.75455	7.655735	1.972416	2
Critical value at 5%	29.79707	15.49471	3.841466	21.13162	14.26460	3.841466	

Notes: * indicates rejection of the null hypothesis of no-cointegration at 5% level of significance

Source: Author's calculation

Trace test and Eigenvalue test agree and indicate that there exists a maximum of 1 cointegrating relationship in each of the model A, model B and model C at 05 per cent level of significance. No cointegration is found in the model D. These test results indicate that finance and growth variables show a long-run equilibrium relationship when any one of the control variables *I, S,* or *T* is used in the test. It is therefore necessary to extend this research further under model A, model B and model C.

Table IX: Cointegrated Equations

Model	LM Test Statistic 1/	Joint Jarque-Berra Test Statistic 2/	Cointegrated Equations	α_{11} 3/
A: (*F,PCI,I*)	9.287	6.666	F_{t-1} = -29.315 + 2.688 PCI_{t-1} - 1.162 I_{t-1} (-6.450*) (2.225**)	-0.385 (-3.140*)
B: (*F,PCI,S*)	6.392	14.122	F_{t-1} = 28.240 + 0.108 PCI_{t-1} + 11.591 S_{t-1} (-0.125) (-5.288*)	-0.008 (-0.166)
C: (*F,PCI,T*)	4.033	58.856	F_{t-1} = -23.846 + 2.409 PCI_{t-1} + 1.234 T_{t-1} (-12.395*) (-3.466*)	-0.835 (-5.241*)

Notes: *, ** indicate 1% and 5% level of significance respectively.

1/ Lagrange Multiplier test statistic for measuring serial correlation in the residual (Ho: no serial correlation)

2/ Joint Jarque-Berra test statistic is normal distribution in residual testing (Ho: residuals are multivariate normal is not rejected at 1% level of significance)

3/ α_{11} is the loading factor which measures the speed of adjustment when there is a deviation from the long-run equilibrium

Source: Author's calculation

Table IX shows the relationship between economic growth and financial development. Lagrange Multiplier (LM) test which is performed to find serial correlation in the residuals shows that there is no serial correlation in the residuals. Jarque-Berra test suggests that residuals are Gaussian for all models (multivariate normal). By normalizing the coefficients of F_{t-1} to one, the long-run cointegrated equations show that coefficients *PCI* and *I* in the model A are statistically significant at the 01 percent level and the 05 percent level respectively. In the model B, the *PCI* is not statistically significant but the *S* is significant at the 01 per cent level. According to the model C, coefficients *PCI* and *T* are statistically significant at the 01 per cent level. The long-run relationship show that real output and finance are positively related when control variables of *I* or *T* is used in the regression. Investment variable *I* is positively related to output while *T*, the trade openness is positively related to finance (*F*). In the two equations given under the model A and the model C, loading factors which measure the speed of adjustment back to the long-run equilibrium value, are significant at 01 per cent level. The loading factor is not significant in the model B.

Having established that the variables follow the same order of integration I(1), the causal relationship among these variables can be tested using first differenced series or ECM based Granger causality tests. As the VECM has already been employed due to the presence of cointegration of the variables in the underlying regression, causality will be tested using the Granger causality tests for the model A, the model B and the model C.

The *PCI* is correctly signed in the three models and the causality results are presented in respect of all models despite the fact that the relation between *PCI* and *F* is not statistically significant in the model B.

Table X: VEC Granger Causality Test- Model A

Model A : (*F,PCI,I*)

Included observations: 46

Dependent variable: D(*F*)

Excluded	Chi-sq	df	Prob.
D(*PCI*)	6.429398	2	0.0402
D(*I*)	0.487563	2	0.7837
All	6.888769	4	0.0719

Dependent variable: D(*PCI*)

Excluded	Chi-sq	df	Prob.
D(*F*)	0.358718	2	0.8358
D(*I*)	4.274014	2	0.0980
All	4.604855	4	0.3303

Dependent variable: D(*I*)

Excluded	Chi-sq	df	Prob.
D(*F*)	0.705785	2	0.7027
D(*PCI*)	3.376980	2	0.1848
All	3.902913	4	0.4193

The results given in the Table X indicate that the output growth influences the financial development as the estimated χ^2 values are statistically significant at 05 per cent level. However, no feedback relationship between *F* and *PCI* is found in this model. Although, the growth of investment is insignificant for influencing growth of finance, jointly the D(*PCI*)

and the D(*I*) cause positive impact on D(*F*) at the 10 per cent level of significance. The important finding is that the causal link is running only from output to finance. Therefore, it can be concluded with statistical significance that the financial development had not been a causal factor in the economic growth of Sri Lanka. The causal relationship of finance and growth of this model agrees with the view of Robinson (1952) and others who stress the fact that enterprises in any economy play a leading role in growth process and finance only follows the growth in enterprises.

Table XI: VEC Granger Causality Test - Model B

Model B : (*F, PCI, S*)

Included observations: 46

Dependent variable: D(*F*)

Excluded	Chi-sq	df	Prob.
D(*PCI*)	1.737411	2	0.4195
D(*S*)	0.470997	2	0.7902
All	2.543057	4	0.6369

Dependent variable: D(*PCI*)

Excluded	Chi-sq	df	Prob.
D(*F*)	0.236302	2	0.8886
D(*S*)	0.399128	2	0.8191
All	0.678652	4	0.9539

Dependent variable: D(*S*)

Excluded	Chi-sq	df	Prob.
D(*F*)	1.058696	2	0.5890
D(*PCI*)	0.390466	2	0.8226
All	1.351844	4	0.8525

The model B tested using the control variable *S* provides results that have no any statistical significance. Hence, we could disregard this model for measuring the causal link between output and financial development. These results are obviously in compatible with the respective cointegrated equation of which coefficients of *PCI* and α_{11} were also reported statistically insignificant.

Table XII: VEC Granger Causality Test - Model C

Model B : (*F, PCI, T*)

Included observations: 46

Dependent variable: D(*F*)

Excluded	Chi-sq	df	Prob.
D(*PCI*)	4.209181	2	0.0919
D(*T*)	6.187976	2	0.0453
All	10.66022	4	0.0307

Dependent variable: D(*PCI*)

Excluded	Chi-sq	df	Prob.
D(*F*)	0.125002	2	0.9394
D(*T*)	0.758704	2	0.6843
All	1.352109	4	0.8525

Dependent variable: D(*T*)

Excluded	Chi-sq	df	Prob.
D(*F*)	2.486358	2	0.2885
D(*PCI*)	3.561593	2	0.1685
All	4.891986	4	0.2986

The results given in the Table XII in respect of the model C which uses D(*T*) as the control variable show that D(*PCI*) and D(*T*) have a causal relationship with D(*F*) at the 10 per cent and 05 per cent level of significance respectively. When these variables taken jointly, the causal link is significant with *F* at the 05 per cent level. However, no feedback relationship is found between output and financial development in this model as well. The development in finance causes no impact on growth of trade openness in the country according to the results given in the Table XII.

6. Policy Implications and Conclusions

A large number of empirical studies on the finance-growth nexus have found a positive correlation between the financial development and the economic growth. This research also finds a strong positive correlation between financial sector development and economic growth for Sri Lanka. Since the establishment of the causality has policy implications on the formulation of appropriate financial sector policies, this research has focused on identifying causal relationship of the finance-growth nexus relating to Sri Lanka. The cointegration and ECM based Granger causality tests were conducted and analysed for this purpose.

The cointegration results show that there is a long-run relationship between real output and finance when investment (*I*) or trade openness (*T*) is used as a control variable in the regression. The investment is positively related to output while the trade openness is positively related to finance (*F*). The causality test results show that the economic growth causes the financial development of the country but there is no feed-back relationship between these two variables. This finding falls into the school thought of Robinson (1952), which believes in that the financial sector development takes place only in response to the economic growth of a country. Further, this conclusion is in line with the views expressed by Demetriades and Hussein (1996), Macri and Sinha (2001) and Abma and Fase (2003) but basically disagrees with the observations made by Ahmed and Ansari (1998), on the finance-growth link relating to Sri Lanka. Ahmed and Ansari (1998) have tested causality using variables at their levels, the procedure of which the results are valid only if the underlying variables are stationary or they are cointegrated. The current study has recognized these aspects and accordingly checked the presence of stationarity and cointegration of the variables, using appropriate econometric tests before conducting causality tests.

Further, the causality tests of this research also suggest that the increase in investment causes economic growth while the increase in investment and economic growth jointly cause the financial sector development. It is also evident that increase in trade individually and together with economic growth causes the improvement in the financial sector. With

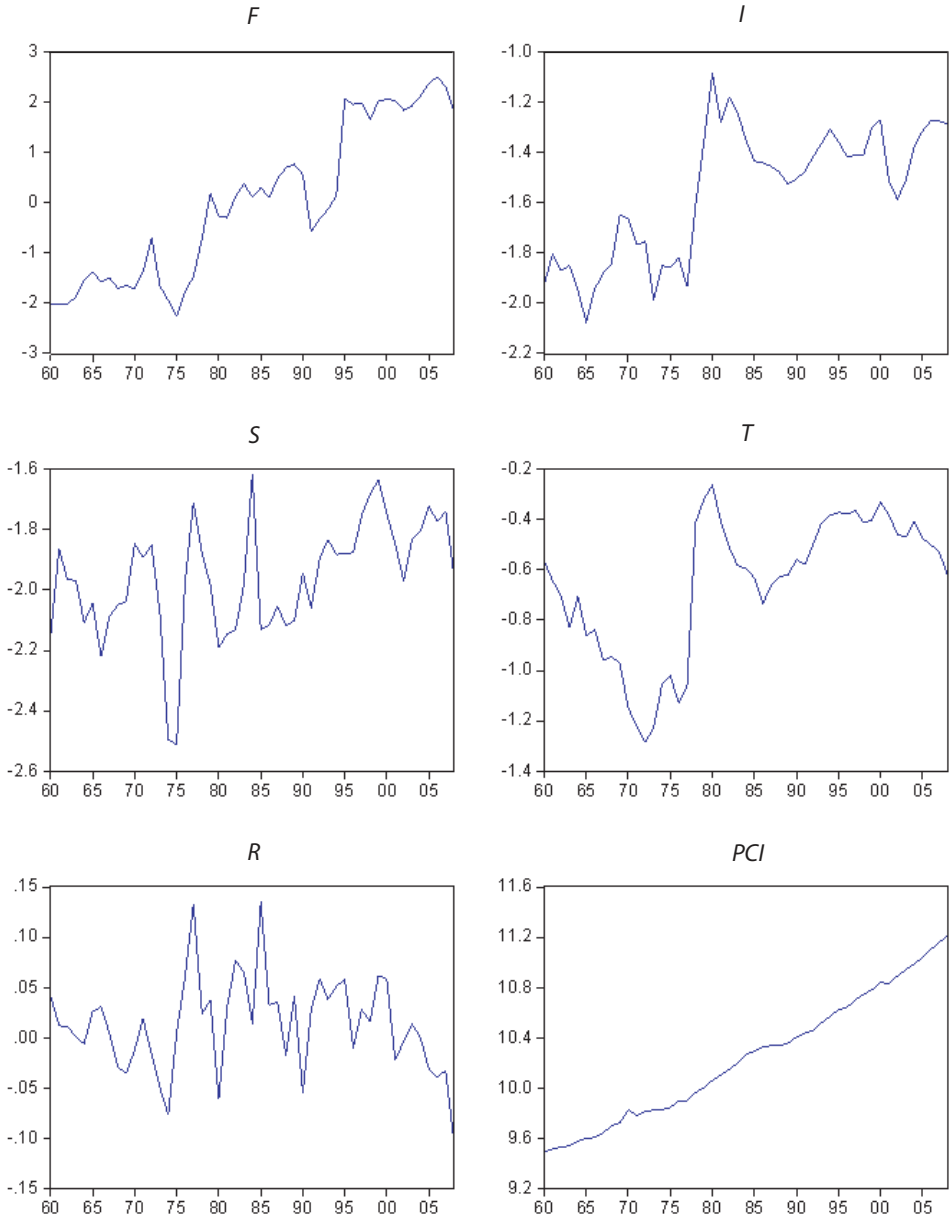
some degree of statistical significance, it is also possible to deduce that there is a causal impact running from the economic growth to export and import trade of the country. In summary, the financial sector development of the country is dependent upon its economic growth, investment and trade but there is no feed-back relationship running from financial development to any of these variables.

The main finding of this research which supports the demand following hypothesis rather than any other relationship including the most competing view, the supply leading hypothesis, implies further that the economic growth of the country is mainly influenced by other variables such as investment. As far as the policy implications are concerned, this finding indicates that relevant authorities need to focus on investment in achieving higher economic growth. It is also observed that financial markets and institutions of the country grow in response to the demand created by growing economy and increase in investment and trade. This process, in turn, would facilitate the financial sector of Sri Lanka to achieve efficiency through financial widening and deepening as predicted by the theory and empirical evidence.

As discussed in the literature review, Jung (1986), Demetriades and Hussein (1996), Macri and Sinha (2001), Ang and McKibbin (2007), Liang and Teng (2006) and Kemal et al. (2007) have expressed views that go entirely or partially in line with the demand following hypothesis. Some of these research studies have also highlighted that the financial development has not caused higher economic growth due to the effect of country specific conditions including the unavailability of efficient financial systems. These aspects in relation to Sri Lanka have been assessed briefly in section 3. However, the finance-growth nexus may be viewed further in relation to the effectiveness of financial system of Sri Lanka in performing its tasks that would have been instrumental in the determination of causality pattern between the financial sector development and the economic growth of the country.

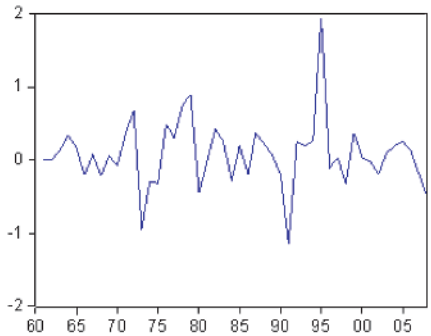
Appendix 1

Key Variables in Levels

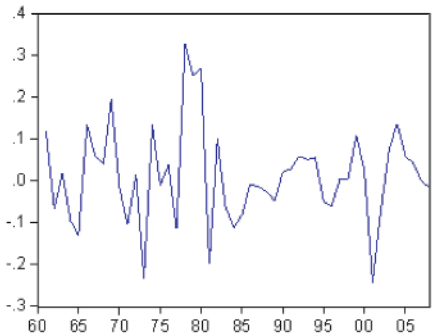


Key Variables in First Difference

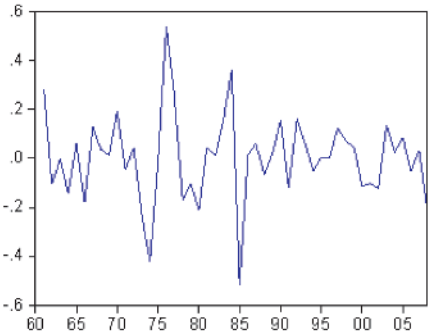
D(*F*)



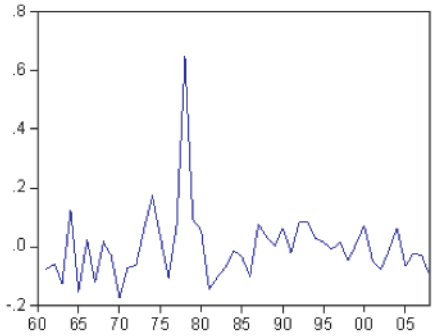
D(*I*)



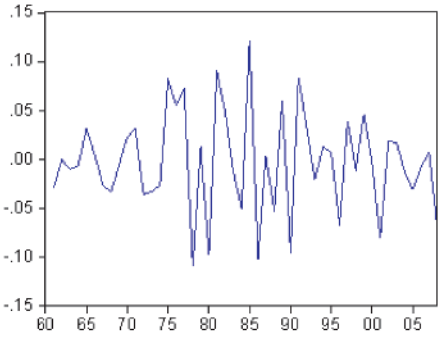
D(*S*)



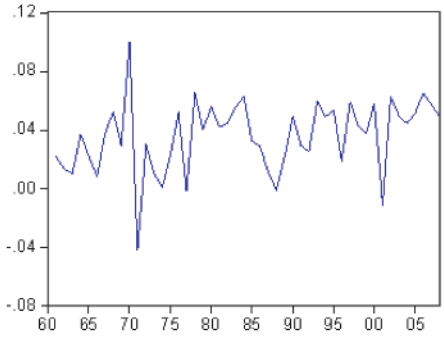
D(*T*)



D(*R*)



D(*PCI*)



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