IDEC DP^2 Series Vol.6 No.6

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September 2016

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Abstract

A well-developed financial sector can affect a country's economic development by channeling financial resources in the most productive way and by providing sufficient credit to the private sector for investments. Studying the relationship between financial development and economic growth has become increasingly important. Although there are a significant number of studies on this subject, ideas about the relationship between financial development and economic growth are controversial due to mixed results. The theoretical background to this relationship has a long history. In 1911, Schumpeter argued that financial development plays an essential role in economic development because intermediary financial institutions have the capacity to allocate savings to more productive investments that promote economic progress. Other empirical studies have shown unidirectional, bidirectional or no relations between these two factors.

Sri Lanka introduced reforms to its financial sector in 1977 by implementing an open economic policy. Therefore, studying the relationship between financial development and economic growth in this country is important. The objective of this study is to examine the relationship between financial development and economic growth in Sri Lanka for the period 1952 to 2014. After considering time series characteristics of the data, this study employs vector error correction methodology. This study uses five variables: real per capita GDP, ratio of broad money to GDP, ratio of investments to GDP, deposit interest rate in real terms and trade ratio.

The results of this study confirm that there is a unidirectional relationship from financial development to economic growth in Sri Lanka. In addition, the investment ratio and trade ratio negatively affect the real per capita GDP and broad money ratio, while the deposit interest rate positively affects both variables. There are two cointegrating relationships among the five variables, and the error correction coefficients show economically and statistically significant results. The error correction coefficient of the GDP relationship is -0.0430 while error correction for broad money supply is -0.3693.

This study highlights the importance of developing the financial sector in Sri Lanka to increase the growth of the country's GDP. The interest rate has become the significant factor for GDP growth and for implementing monetary policy. The open economic policy has significant effect on money supply, and money supply affects the economic growth in the short term. Therefore, policy makers should consider about the time range in making policies.

Key words: Financial development, economic growth, vector error correction, Sri Lanka

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1. Introduction

At a broad level, a robust and efficient financial system promotes growth by channeling resources to uses where they can be most productive and by fostering a more efficient allocation of resources (Estrada, Donghyun, & Ramayandi, 2010). As per (LIANG & TENG, 2006), ever since the pioneering contributions of Schumpeter (1911), and more recently of Patrick (1966), Goldsmith (1969), MacKinnon (1973) and Shaw (1973), the relationship between financial development and economic growth has been an important subject in economic literature. Schumpeter (1911) notes the role of financial intermediaries in mobilizing funds, evaluating and selecting projects, managing risk, monitoring entrepreneurs and facilitating transactions. These are the critical elements of fostering technical innovation and economic growth. To enhance our understanding of the causal relationship between financial development and economic growth, it is essential to perform studies of individual countries using a diverse set of financial measures (Abu-Bader & Abu-Qarn, 2008).

Sri Lanka introduced reforms to its financial sector nearly four decades ago, in conjunction with the introduction of an open market economic policy. The reforms were mainly directed at the banking sector, which is the leading sector in the country's financial system. As in most developing countries, commercial banks are the leading financial intermediaries in Sri Lanka's economy. The objectives of the reforms to the financial sector were to improve private sector participation, remove restrictions on banking products such as interest rates and loans, relax exchange rates, open financial markets to foreign and domestic competition, and encourage the efficient functioning of financial markets with less governmental interference.

A sufficient number of studies have examined the relationship between financial development and economic growth at the level of individual countries, and across panels of countries, using different methodologies. The results of those studies have varied across time periods and countries due to their different methodologies and country specifications. Accordingly, some empirical studies have shown a unidirectional relationship between financial development and economic growth while others have shown a bidirectional relationship or no relationship at all. Against this background, therefore, it is important to examine the relationship between financial development and economic growth in Sri Lanka. The objective of this study is to examine the relationship between financial development and economic growth in Sri Lanka for the period 1952-2014. To pursue this objective, this study has developed the following research questions: What are the factors affecting to the long term financial development and economic growth in Sri Lanka, How is the short term relationship between financial development and economic growth in Sri Lanka, and What are the some significant policy implications and suggestions for financial sector in Sri Lanka?

To examine the relationship between financial development and economic growth in Sri Lanka, this study uses five annual macroeconomic variables for the period 1952 to 2014: real per capita GDP, ratio of broad money supply to GDP, ratio of investments to GDP, deposit interest rate in real terms and trade ratio are used in the estimation. In addition, two dummy variables are used for open market economic policy and external shocks. This study uses vector error correction methodology (VECM). There are some advantages to using VECM. The VECM approach allows us to distinguish between short-term and long-term Granger causality. When the variables are cointegrated, deviations from this long-term equilibrium in the short-term will feed back on the changes in the dependent variable to force movement towards the long-run equilibrium (Masih &

Masih, 1996). In addition, through the VECM procedure, we can obtain information about the direction of the causality among variables. Therefore, this study employs the VECM approach based on previous studies and on the above mentioned advantages.

This study is organized as follows: section two presents information on the financial sector of Sri Lanka. The third section reviews previous literature and section four describes the data and methodology used in this study. Section five presents the empirical results and discussion results while section six presents the conclusion and policy implications.

2. Financial sector of Sri Lanka

Sri Lanka was the first country in the South Asian region to introduce reforms to its financial sector. With the introduction of its policy of an open economy in 1977, Sri Lanka initiated its financial sector reforms to enhance economic growth by improving the efficiency of its financial markets. There were changes in the activities of the money market, capital market, electronic market and micro financial market as per (Edirisuriya, 2007).

A number of policy changes were introduced since then and the process has been continuing. Among the significant measures taken during this time to deregulate the financial sector include interest rate deregulation, introduction of market based credit policies, relaxation of market entry for foreign and local banking firms and improved supervisory measures including appropriate legislative measures to safeguard the financial system. This financial market deregulation policy package could be regarded as the most comprehensive package among all South Asian countries. The establishment of the Colombo Stock Exchange (CSE) in 1984 could be regarded as another most significant outcome of financial sector reforms in Sri Lanka. The CSE has opened its public trading floor for the ordinary public and modern share trading has now become a normal day to day activity for many ordinary people in the country (Edirisuriya, 2007).

This process was facilitated by new telecommunication technology. The financial sector introduced telephone banking, internet banking and automatic teller machines throughout the country.

The Central Bank of Sri Lanka (CBSL) is the national authority responsible for implementing the country's monetary policy. The CBSL was established under the Monetary law Act no. 58 of 1949. As per the Monetary Law (as amended), the Monetary Policy Committee of the CBSL is charged with determining and implementing monetary policy in Sri Lanka to achieve the macroeconomic goals of stability and growth. In this regard, the stability of the economy depends on the stability of the country's prices, banking system, foreign exchange reserve and financial system. The CBSL possesses a wide range of tools that are used as instruments of monetary policy, such as (a) policy interest rates and open market operations and (b) the stability reserve requirement on commercial bank deposit liabilities

The monetary policy of Sri Lanka has experienced many changes since the introduction of reforms to its financial sector, and these changes have paralleled the country's policy of an open market-oriented economy. In the 1980s, the Central Bank formally adopted a monetary targeting policy framework. Under this policy framework, the Central Bank seeks to achieve its final objectives by using monetary policy to maintain reserve money, the Bank's operating target, at a level that is consistent with the desired growth of broad money, the Bank's intermediate target (Perera & Jayawickrama, 2013). As per (Amarasekara, 2008) the CBSL amended its monetary

policy objectives in accordance with international standards in 2002. The objectives of the monetary policy are (i) economic and price stability and (ii) financial system stability. The CBSL has moved to the broader adaptation of inflation targeting practices, which are preferred over either monetary aggregates or the exchange rate. The main policy instruments are interest rates and open market activities.

Monetary aggregates are one of the key controlling factors in implementing the monetary policy of a country. The CBSL uses a wide range of instruments such as policy interest rates, open market operations and reserve requirements to control monetary aggregates in the country. There are there main monetary aggregates in Sri Lanka.

Reserve money

Reserve money consists of currency issued by the central bank and commercial banks that is deposited with the central bank. This is also called high-powered money, as commercial banks can create deposits based on reserve money through their process of creating credits and deposits.

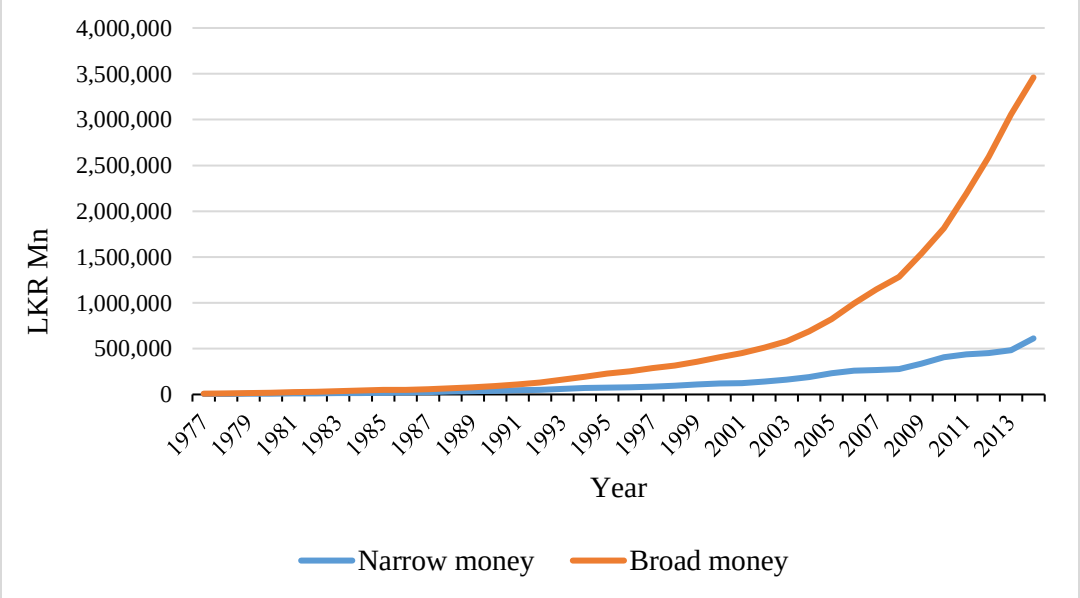
Narrow money supply (M1)

The narrow money supply is defined as the sum of currency held by the public and demand deposits held by the public with commercial banks. This definition of money is often used for the empirical studies.

Broad money supply (M2)

This includes the sum of the currency held by the public and all deposits held by the public with commercial banks. Studies have shown that the most appropriate monetary variable to analyze the relationship between the money supply and the general price level is the broad money supply (Central Bank of Sri Lanka, 2016).

Figure 1. Money supply of Sri Lanka



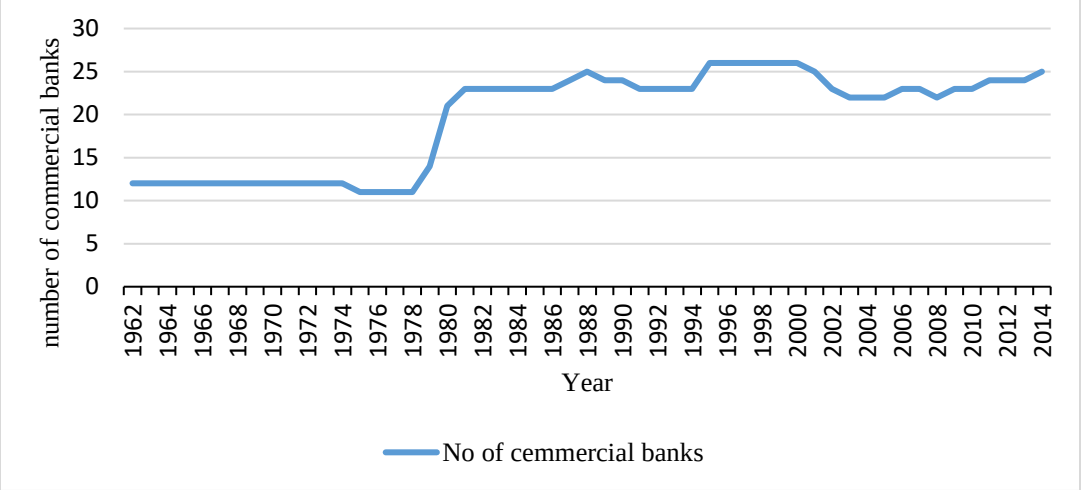
Source: Central Bank of Sri Lanka

Figure 1 shows Sri Lanka's narrow and broad money supply from 1977 to 2014. The broad money supply increased more rapidly than the narrow money supply after the year 1995. This indicates that the deposits (time and saving deposits) increased rapidly.

In most developing countries, commercial banks are the leading financial intermediary institutions. Commercial banks mobilize funds from the public and channel those funds to people who need money for their economic activities. Thus, commercial banks play an important role in the economy as they can ensure the efficient allocation of assets, which can improve the output and productivity of the economy.

In Sri Lanka, commercial banks are the leading financial intermediary institutions in the economy. Figure 2 shows the number of commercial banks in Sri Lanka from 1962 to 2014. It shows that since the introduction of the open economy policy in 1977, the number of commercial banks has grown rapidly as a result of the relaxation of market entry conditions. There were 25 licensed commercial banks in Sri Lanka at the end of 2014, including 12 foreign banks.

Figure 2. Number of commercial banks



Source: Central Bank of Sri Lanka

In addition, banks are in the process of increasing their branches and business activities in the country. Table 1 shows selected indicators of financial inclusion in Sri Lanka, illustrating the importance of the banking sector in the economy. It shows that all features of the banking sector are growing annually.

Table 1. Selected indicators of financial inclusion[3]

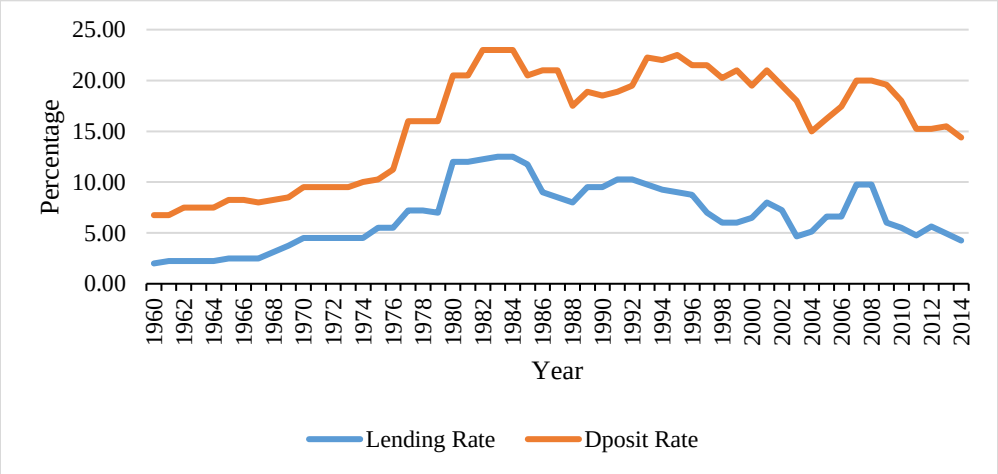
	2005	2010	2013
No. of bank branches*	3,685	4,911	5,522
Banking density (No. of bank branches per 100,000 persons)	18.8	23.8	27.0
Total no. of ATMs	918	2,222	3,122
No. of ATMs per 100,000 persons	4.7	10.8	15.2
Total no. of electronic fund transfer facilities at point of sales machines (EFTPOS)	7,013	27,588	27,955
Total no. of credit cards	628,989	769,182	951,625
Credit cards per 100,000 persons	3,202	3,724	4,646

Source: Central Bank of Sri Lanka

* Includes outlets of licensed commercial banks, licensed specialized banks and district co-operative rural banks but excludes student savings units.

Interest rates are one of the main monetary policy instruments of the CBSL. The Central Bank creates an interest rate corridor by repurchasing and reverse repurchasing in open market activities. In addition, the bank rate is the interest rate on credit to banking institutions by the central bank as lender of last resort. The central bank controls the monetary aggregates and interest rate in the country by using these policy interest rates. Commercial banks decide their lending and deposit interest rates based on these policy interest rates and under the guidance of the central bank.

Figure 3. Interest rates



Source: Central bank of Sri Lanka

[3] Financial inclusion can be broadly defined as the access to appropriate financial products and services at an affordable cost by all sections of society in general and to low income groups in particular who are underserved or have been excluded from formal financial services (Annual Report of Central Bank of Sri Lanka,2014)

Figure 3 shows the deposit and lending interest rates of commercial banks from 1960 to 2014. The highest lending rates were recorded in 1982, 1983 and 1984, showing an annual rate of 23 percent. Meanwhile, the highest deposit rates were also recorded in the same period. The deposit rate was 12.25 percent in 1982 and increased to 12.5 percent in 1983 and 1984.

3 Literature review

The financial sector is the set of institutions, instruments, and markets, as well as the legal and regulatory framework, that permit transactions to be made by extending credit. Fundamentally, the development of the financial sector is about overcoming "costs" incurred in the financial system. This process of reducing the costs of acquiring information, enforcing contracts, and making transactions has resulted in the emergence of financial contracts, markets, and intermediaries (World Bank, 2016).

An effective financial system may positively affect economic growth and industrialization. Theory suggests that financial instruments, markets, and institutions arise to mitigate the effects of information and transaction costs. Furthermore, a growing literature shows that differences in how well financial systems reduce information and transaction costs influence savings rates, investment decisions, technological innovation, and long-run growth rates (Levine 1997). If a country has a well-developed financial sector, it will experience faster economic growth even if other factors control that growth. Financial development can affect economic growth mainly through two channels: capital accumulation and technological innovation. In the 1960s, Arrow & Debreu developed a theoretical model of financial development without information costs. But, financial institutions must also bear different types of information and transaction costs.

Financial markets and intermediaries perform key functions in an economy. They mobilize savings; allocate resources; monitor managers and exert corporate control; facilitate trading, hedging, diversifying, and pooling risks; and facilitate the exchange of goods and services. These activities lead to growth through the channels of capital accumulation and technological innovation.

Empirical studies on the nature of the relationship between financial development and economic growth have been debated due to their mixed results. Some researchers have found a positive relationship between these variables while others have found a negative relation or no relation at all. Empirical work on the issue of causality between financial development and economic growth, remains (Demetriades & Hussein, 1996).

Many studies support the view that the development of financial sector is essential for economic development. Empirical work by (King and Levine, 1993), using data on 80 countries over the period 1960-1989, concluded that there is an important link between financial sector development and economic growth. They constructed four financial development indicators and two growth indicators for their study. They found that higher levels of financial development are positively associated with faster rates of economic growth, physical capital accumulation, and economic efficiency improvements both before and after controlling for numerous country and policy characteristics. Furthermore, the predetermined component of financial development is a good predictor of long-run growth over the next 10 to 30 years.

(Demetriades & Hussein, 1996) conducted a causality test of financial development and real GDP, employing VECM and causality for 16 countries using 27 years of annual time series

data. The results of their study provide very little support for the view that finance is a leading sector in economic development, and in quite a few countries economic growth systematically causes financial development. The results of the causality test are very much country-specific.

(Hui Boon & Ahmad Zubaidi, 1999) reexamined the dynamic causal chain among money, real output, interest rates and inflation, focusing on Malaysia as a small fast-growing country. They employed Johansen's multivariate cointegration analysis followed by VECM, Granger causality, variance decomposition and impulse response functions using data from 1975-1 to 1995-12. The results suggested that a stable long-run equilibrium relationship exists among these macroeconomic variables. In the short-run, there are unidirectional relationships from M1 to Y, M3 to Y, M1 to R, P to R, and P to M2 and a bidirectional feedback relationship between M1 and P. They conclude that the narrow money supply (M1) is the most effective intermediate monetary target to curb inflation.

(Abu-Bader & Abu-Qarn, 2008) examined the causal relationship between financial development and economic growth in Egypt during the period 1960-2001 within a tri-variate vector autoregressive framework. They used four financial development indicators, real per capita GDP as an economic development measure, and ratio of investment. Their results strongly suggest that financial development and economic growth are mutually causal; that is, causality is bi-directional. They conclude that financial development produces economic growth by increasing resources for investment and enhancing efficiency.

(Chang & Caudill, 2005) examined the relationship between financial development and economic growth in Taiwan from 1962 to 1998, employing VECM with four variables. The result of their study confirm that there is a unidirectional causality running from financial development (measured as the ration of M2 to GDP) to economic growth, which supports the supply leading hypothesis[4].

(LIANG & TENG, 2006) examined the relationship between financial development and economic growth in China by employing VAR using annual data for the period 1952-2001. They found that physical capital stock, international trade and real interest rates are economically and significantly related to economic growth and GDP, and real interest rates are related to financial development in China. They concluded that there is only a unidirectional causality from economic growth to financial development.

Based on the above, we can conclude that studies of a relationship between financial development and economic growth have shown mixed results across different backgrounds. The relationship can vary by country and over time. Therefore, this research aims to examine the situation in Sri Lanka.

[4] There are two hypotheses in financial development: supply leading and demand following. The supply leading hypothesis contends that financial development causes real economic growth while demand following hypothesis argue for a reverse ordering from real economic growth to financial development.

4 Data and methodology

Annual macroeconomic time series data from the years 1952 to 2014 (consisting of 63 observations) are used in this study. The objective of this study is to examine the relationship between financial development and economic growth in Sri Lanka and to examine the macroeconomic factors affecting financial development and economic growth. As described in the literature review, different scholars have used different variables to examine this relationship, and they have used different methodologies on panels of countries and individual countries. This study uses five variables to examine the relationship between financial development and economic growth in Sri Lanka. The variables are real per capita GDP (Y) as economic growth indicator, ratio of broad money to GDP (M2) or deposit liabilities ratio (DLR) as financial development indicator, commercial bank deposit rate in real terms (R), ratio of real investments to real GDP (INVT) and trade ratio (ratio of real imports + real exports to the real GDP) (TR). The consumer price index (2010=100) is used to convert the data into real terms.

The descriptive statistics of the variables are presented in the table 3. However, in this study, our main goal is an econometric analysis to examine the relationship between financial development and economic growth.

Table 3. Descriptive statistics of the variables

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Y	5628.30	3932.37	10766.73	1851.13	3409.86
M2	0.2841	0.2891	0.3537	0.1798	0.0430
INVT	0.2176	0.2534	0.4120	0.0000	0.1002
R	4.1467	3.4462	11.6663	-7.0022	3.8390
TR	0.5784	0.6226	0.9445	0.2315	0.1691

There is a wide range of empirical studies examining the relationship between financial development and economic growth. Many scholars have used the Vector Error Correction Model (VECM) in their time series analyses. The VECM approach allows us to distinguish between short-term and long-term Granger causality. When the variable are cointegrated, then in the short-term, deviations from this long-term equilibrium will feed back on the changes in the dependent variable in order to force movement towards the long-run equilibrium (Masih & Masih, 1996). In addition, the direction of the relationships among all variables can be obtained from VECM mechanism. Time series characteristics of the data should be tested when employing VECM. All the variables should be integrated into the same order. If two or more variables have a common trend, they will be cointegrated. (Engle & Granger, 1987) demonstrated that once a number of variables are found to be cointegrated, there always exists a corresponding error correction representation. The VECM estimation procedure is as follows: perform unit root test to confirm that variables are stationary, determine the appropriate lag length, perform co-integration test to confirm that variables have long-run relationship, conduct VECM, perform Granger causality test to identify short run relationships among variables and perform impulse response functions to check responses of the variable for shocks.

System specification to identify cointegrating vectors and test the relationship among variables should be carried out based on standard literature. As described in the section 3, (LIANG & TENG, 2006) used five variables to examine the relationship between financial development and economic growth in China. This study uses Y, M2 or DLR, INVT, R and the TR. The reason behind the selection of M2 as a proxy for financial development is that most previous studies have used M2 as a standard measure of financial development. The same estimation will done with DLR also. Following "*Introductory Econometrics: A Modern Approach*"(Wooldridge, 2012) and other previous studies the VECM estimation model of this study is as follows;

$$\Delta Y_t = \boldsymbol{\alpha_0} + \boldsymbol{\gamma_0 \Delta Y_{t-h}} + \boldsymbol{\alpha_1 D_{open}} + \boldsymbol{\alpha_2 D_{ext}} + \boldsymbol{\delta CE} + u_t$$

Where, Y: a vector of 5 variables, γ_0 *:* matrix of short term coefficients, D_{open}: dummy variable for open economic policy (1=1977-2014, otherwise 0), D_{ext} : dummy variable for external shocks (1=1973: oil price shock, 1997: Asian financial crisis, 2001: 9/11 attack, 2005-2008: increasing of oil price, otherwise 0) , δ : error correction coefficients, CE : cointegration equation vector, h : no of lags, *t :* time period and Δ : difference.

The first part of the equation (in bold letters) explains the short-term relationship among variables. The error correction coefficient contains long-run information as it is derived from long-term cointegrating relationship(s). The error correction coefficient is a short-term adjustment coefficient and represents the proportion by which the long run disequilibrium (or imbalance) in the dependent variable is being corrected in a short period. Non-significance or elimination of any of the 'lagged error correction terms' affects the implied long term relationship and may be a violation of theory (Masih & Masih, 1996).

Based on the time series estimation procedure, unit root test should be performed to check whether variables are stationary or not. To perform the cointegration test, all variables should be integrated into the same order (more than zero). An Augmented Dicky Fuller (ADF) test is used to determine the order of integration of the variables. The results of the ADF test are presented in Table 4. Variables are not stationary at the level but become stationary in first difference. Therefore, all the variables are I(1), satisfying the requirements of the time series analysis.

Table 4. Results of the unit root test

Variable	**Level**		**First difference**	
	Test stat	P value	Test stat	P value
Y	-0.896145	0.7832	-7.872102	0.0000
M2	-1.777306	0.3881	-7.306614	0.0000
INVT	-2.1394959	0.2304	-7.3769812	0.0000
R	-1.080685	0.7180	-11.45186	0.0000
TR	-2.179767	0.2156	-5.701323	0.0000
Test critical value at 1% significance level are is -3.54				

Determining the optimum lag length is a critical issue in the cointegration and VECM analyses. A change in the lag length will change the results entirely. In this study, the results of

the lag length selection tests indicate that many criteria and suggest a time lag of three as optimal (table 5) Therefore, the optimal selected time lag for the first difference is lag 2.

Table 5. Results of the lag length selection test

Lag	**Sequential modified LR test statistic (each test at 5% level)**	**Final Prediction Error (FPE)**	**Akaike Information Criterion (AIC)**	**Schwarz Information Criterion (SC)**	**Hannan Quinn Information Criterion (HQ)**
0	NA	2.058104	14.91115	15.09037	14.98080
1	461.1442	0.000588	6.746303	7.821593*	7.164197*
2	45.80807	0.000533	6.627668	8.599033	7.393808
3	44.72713*	0.000454*	6.413956*	9.281396	7.528341
4	28.54902	0.000548	6.498120	10.26164	7.960750
5	28.19302	0.000636	6.465861	11.12545	8.276737

* Indicates lag order selected by the criterion.

If the variables are integrated to same order, a test of cointegration can be performed to check for the existence of a stable long-run relationship. (Johansen, 1991) developed two tests for checking the existence of the cointegration: the Maximum Eigen value test and Trace test. If the numbers of variables are p, the maximum number of cointegrating relationships that can be in existences are p-1. If the variables are cointegrated, the VECM can be performed to test long-term relationships. Relationships between financial development (proxied by the M2 ratio or DLR) and economic growth (proxied by real per capita GDP) can be obtained from VECM test. The Granger Causality test should be conducted to check short term relationships between variables. It is important to check the direction of the causality when making economic policies. This test must be performed in the environment of the VECM results because it must use the same lag period. As per (Chang & Caudill, 2005) Granger (1988) notes that if there exists a cointegrating vector among variables, there must be causality among these variables at least in one direction. The impulse response function captures the effect of a one-time shock to one innovation on current and future values of the study. A one-standard-deviation shock on the real per capita GDP and M2 ratio will be imposed to check the reactions of other variables for the next 10 years.

5. Empirical Results and discussion

5.1 Empirical results

Five variables are used for the estimation of the cointegration, namely, real per capita GDP, M2 ratio, investment ratio, real deposit rate and trade ratio. Optimal lag length is lag 2. The results of the Johansen test are presented in table 6.

Table 6. Results of the Johansen test of cointegration

No. of cointegrating vectors	Trace Statistics	5% critical value	Maximum Eigen statistics	5% critical value
None*	97.89635	69.81889 (0.0001)	40.59810	33.87687 (0.0068)
At most 1*	57.29826	47.85613 (0.0051)	31.27407	27.58434 (0.0160)
At most 2	26.02419	29.79707 (0.1280)	14.03325	21.13162 (0.3623)
At most 3	11.99094	15.49471 (0.1574)	10.24009	14.26460 (0.1966)
At most 4	1.750847	3.841466 (0.1858)	1.750847	3.841466 (0.1858)

* Denotes rejection of the hypothesis at the 0.05 level. Probability is in (.)

Null hypotheses of none and at most one are rejected at the five percent level, indicating that the variables are cointegrated. This means that the variables have a common trend in the long run. As per both Trace statistics and Maximum Eigen statistics, there are two cointegrating relationships in the long term. This study uses the first cointegrating vector as the economic growth relationship and the second cointegrating vector as the financial development relationship to find relationships among variables. As the variables are cointegrated, the VECM can be performed to check the directions and magnitude of relationships among variables.

The non-restricted VECM is conducted using Y, M2, INVT, R and TR for the period from 1952 to 2014. In addition, two dummy variables – OPEN: for open economic policy and EXT: for external shocks – are used as exogenous variables. The results of the unrestricted VECM are presented in table 7. The first part of the table shows the coefficients of the two cointegrating equations, which are derived from long-term cointegrating relationships. In the first cointegrating equation, dependent variable is Y, and it explains the relationship with the other three variables. In this equation, the value of the M2 is zero as there are two cointegrating equations as a result of normalizing cointegrating equations. Investments and trade ratio have negative significant relationships to the real per capita GDP while the real deposit rate shows a positive and significant relationship to the real per capita GDP. The dummy variable for open economic policy shows a negative significant effect on the real per capita GDP, and the dummy variable for external shocks indicates a negative relation although it is not significant. The error correction coefficient, which shows the magnitude of the annual correction of imbalances in the long-term equilibrium, is -0.043003 with a significant level of five percent.

The second cointegrating equation expresses the relationships of other variables to the M2 ratio. The investment ratio and trade ratio have negative significant relationships to the M2 ratio while the real deposit rate has a positive significant relationship to the M2 ratio. The Dummy variable used for open economic policy shows a positive significant result, while the dummy variable for external shocks shows a negative significant result. The error correction coefficient of the M2 equation is -0.3693 and significant.

The second part of the table shows the short-term coefficients of the VECM results. Some of the coefficients are significant at different levels. A change in real per capita GDP negatively

affects the next period's real per capita GDP. A change in lag 2 of the M2 ratio also negatively affects the real per capita GDP. A change in lag 1 of the investment ratio positively affects the change in real per capita GDP. Lag values of the real deposit rate do not show significant results from the change in real per capita GDP. A change in lag 1 of the trade ratio negatively affects the change in real per capita GDP. With regard to the short-term coefficients of the M2 relationship, a change in real per capita GDP (in lag 1 & 2) positively affects the M2 ratio. None of the other variables shows significant results.

Table 7. Results of the VECM

Note: significance levels ***=1%, **=5% & *=10%

Cointegration

Cointegrating Eq.	**Coint. Eq. 01**	**P value**	**Coint. Eq. 02**	**P value**	
Y(-1)	1.0000		0.0000		
M2(-1)	0.0000		1.0000		
INVT(-1)	153334.0***	0.000029	0.6389***	0.00183	
R(-1)	-1998.93***	0.00064	-0.0072**	0.02853	
TR(-1)	78761.05***	0.00001	0.3821***	0.00001	
C	-76929.37		-0.6188		
Error Correction					
Coin. Eq. 1	-0.043003**	0.0422	2.05E-06***	0.0022	
Coin. Eq. 2	10740.33***	0.0013	-0.3693***	0.0006	
Short-term coefficients					
	D(Y)	**D(M2)**	**D(INVT)**	**D(R)**	**D(TR)**
D(Y(-1))	-0.4110**	1.03E-05*	-2.57E-05**	-0.00055	3.39E-05
D(Y(-2))	0.0299	9.80E-06*	-1.57E-05*	-0.00087*	-2.54E-05
D(M2(-1))	-3844.95	0.1592	0.1509	13.036	0.5410
D(M2(-2))	-11753.08***	0.0402	-0.6251**	1.0908	1.2734***
D(INVT(-1))	4142.73*	-0.0776	0.1713	2.1377	0.3324
D(INVT(-2))	-194.15	-0.0892	0.2965*	6.4192	0.2793
D(R(-1))	-23.90	-0.0006	-0.0022	-0.6131***	0.0007
D(R(-2))	46.10	0.0005	0.0020	-0.2635*	-0.0011

D(TR(-1))	-2042.03*	0.0437	0.0130	-8.2437*	0.1520
D(TR(-2))	457.38	0.0414	0.0309	0.0264	-0.1222
C	646.43***	-0.01306**	0.0016	-0.1757	-0.1197***
OPEN dummy	-1214.48***	0.0301***	-0.0019	0.0122	0.170***
EXT dummy	-90.595	-0.0130**	-0.0124	-1.5246	-0.0192
R-squared	0.4302	0.4062	0.3713	0.5072	0.6475

The Granger causality test is performed to check the short-term relationship among variables based on the estimated VECM. The results of the Granger causality test are presented in table 8.

Table 8. Results of the Granger relationships

Independent variables	Dependent variables				
	D(Y)	D(M2)	D(INVT)	D(R)	D(TR)
D(Y(-1))	-	5.0676* (0.0794)	5.7496* (0.0564)	2.3074 (0.3155)	2.4155 (0.2989)
D(M2(-1))	7.9184** (0.0191)	-	4.7203* (0.0944)	0.7470 (0.6883)	9.0649*** (0.0108)
D(INVT(-1))	2.7646 (0.2510)	1.4623 (0.4814)	-	0.4832 (0.7854)	1.7742 (0.4118)
D(R(-1))	2.6979 (0.2595)	0.6607 (0.7187)	1.9959 (0.3686)	-	0.1596 (0.9233)
D(TR(-1))	2.3640 (0.3067)	1.8867 (0.3893)	0.1234 (0.9401)	3.1604 (0.2059)	-

Note: chi-square statistics are presented. Probability is in the parentheses. ***= significance at 1% level, **= significance at 5% level & *= significance at 10% level.

The difference in the lagged period of real per capita GDP influences the difference in the M2 ratio and the investment ratio in the current period at the 10% significance level. The lagged differenced value of the M2 ratio affects the difference in real per capita GDP, investments and the trade ratio during the study period at the significant levels of 5%, 10% and 1%, respectively. Relationships among other variables are not significant.

The impulse response function shows how shocks affect the variables. The simulation in this generalized impulse response function covers 10 years. The effects of a one standard deviation innovation in current and future values of the model are presented in appendix 2. This study mainly focuses on how the shocks in Y and M2 affect other variables.

The response of the variables to a shock in real per capita GDP shows that the GDP has a quite stable response throughout the whole period, and there is interdependency. M2 has a positive

impact and normalized over time. The response of investment is negative, confirming the results of the VECM estimation. The response of the real deposit rate also shows a negative impact, as does trade ratio. With regard to the effect of a shock in M2 on other variables, a shock in M2 positively affects the GDP. The response of M2 shows a positive effect and diminishes over the study period. The response of investment is positive and normalizes over time. The response of the interest rate is positive in the first year and becomes negative afterward, which is different from the VECM results. The response of the trade ratio is positive in the first two years and becomes negative afterward, which is also a different result from the VECM.

This study is performed for the period of 1952 to 2014. The VECM is estimated for different sample periods to check the robustness of the results. The remarkable event during this sample period was the introduction of the open economic policy in 1977. Therefore, the VECM is estimated for the period 1952 to 1977, which pre-dates Sri Lanka's financial sector reforms. However, this study found no cointegration among variables during the period 1952-1977. Estimations were performed for the period following the financial sector reforms, from 1978 to 2014, and there are two cointegrations among variables. Consequently, one year after the year 2014 was reduced from the sample and estimated. The results are quite similar until 2003, and there is only one cointegration after 2003. The coefficients show different significant levels and quite a difference in direction and magnitude. The results are presented in appendix 3.

The VECM is estimated with DLR instead of the M2 and the same estimation was done for the period of 1952 – 2001 to compare with LIANG & TENG (2006). The comparison of the estimation results is presented in table 9. LIANG & TENG (2006) used physical capital stock (K) in their study. Our study uses investment ratio as a proxy for physical capital stock due to limitations of data.

Table 9. Comparison of estimation results with DLR

	Liang & Teng, (2006), sample period:1952-2001		**This study, sample period:1952-2001**		**This study, sample period: 1952-2014**	
	Coin. Eq. 1	Coin. Eq. 2	Coin. Eq. 1	Coin. Eq. 2	Coin. Eq. 1	Coin. Eq. 2
Y(-1)	1.0000	-0.4869*** (0.0000)	1.0000	0.0000	1.0000	0.0000
DLR(-1)	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
K/INVT (-1)	-1.1906*** (0.0000)	0.0000	64253.77*** (0.000031)	-1.2973*** (0.00001)	51807.17*** (0.00001)	-0.6800*** (0.00001)
R(-1)	-0.0254*** (0.0000)	0.0735*** (0.0000)	-153.7980 (0.7414)	0.01215* (0.1338)	-355.343*** (0.0079)	0.0112*** (0.00001)
TR(-1)	-0.8326*** (0.0140)	0.0000	399.9597 (0.9399)	0.06756 (0.4603)	10190.65*** (0.0013)	-0.1337*** (0.0009)
C	2.4145	2.05	-19901.08	-0.02172	-21761.47	-0.0329

Error Correction Coefficient	-0.1744*** (0.0095)	-0.0318*** (0.0029)	-0.2136 (0.2518)	-0.6314*** (0.0034)	-0.0463 (0.4665)	-0.4623*** (0.0003)

Note: P values are in parentheses, significance level: *=10%, **=5% & ***=1%

A causality test estimation is carried out to compare the short-term relationships between financial development and economic growth between two countries. Comparison of results is presented in table 10. As per (Liang & Teng,2006) the results from China, there is a unidirectional short-run relationship from GDP to DLR. The results from Sri Lanka are the opposite of the result from China. This sample period also confirms the results with M2 ratio at 5% significant level.

Table 10 Comparison of short term relationships

	Liang & Teng (2006) Sample period: 1952-2001		**This study sample period: 1952-2001**		**This study Main results (1952-2014)**	
	Chi-square	Prob.	Chi-square	Prob.	Chi-square	Prob.
D(DLR(-1)) → D(Y)	0.3154	0.8541	9.5438**	0.0229	11.0643**	0.0259
D(Y(-1)) → D(DLR)	6.7372**	0.0344	0.8019	0.8490	4.0693	0.3967

Note: **= significance at 5% level

This study analyzes the relationship between financial development and economic growth in Sri Lanka using time series data from 1952 to 2014, employing VECM econometric methodology. Five variables are used in the VECM, and two dummy variables are also included in the model. Previous studies have found mixed results for the relationship between financial development and economic growth. Some studies found that financial development affects economic development while others found the reverse, and some results have shown interdependency between both financial development and economic growth. In addition, some studies found no relation.

5.2 Discussion

Based on the results of this study, it can be concluded that financial development affects the economic growth of Sri Lanka (table 8). When we consider the cointegrating equations, three variables – investment, interest rate and trade ratio – show significant relationships to the real per capita GDP and broad money supply (as per the first part of the table 7). Investment ratio and trade ratio have negative relationships with real per capita GDP. This result is not expected as per the theoretical background. However, there is some empirical evidence. (Yenturk et al, 2009) analyzed the interaction among savings, investments and growth in Turkey using the VECM and found that there is no causality from investments to growth. As per (Yenturk et al, 2009) the reason behind this phenomena was that investments in Turkey have not come to full capacity, meaning that there is excess capacity. Until investments come to full capacity, GDP will bring the economy to its full capacity. But further research needs to be carried out to confirm the situation in Sri Lanka.

Trade ratio has also shown a negative relationship to the real per capita GDP, which was not expected. The reason behind this may be that imports are high when compared to exports. Sri Lanka's main export commodity is currently apparel and garments. However, most of the intermediate goods used by the apparel and garments industry are imported. In addition, petroleum and petroleum-related products and consumer goods are also imported. As a result, imports become larger than exports. Meanwhile, Sri Lanka exports other primary goods such as tea, rubber, coconut, cinnamon and other agricultural goods, as well as inputs to manufacturing industries, without adding value. Therefore, Sri Lanka's income from exports is not high and competition with other countries is difficult.

The real deposit rate has shown a positive and significant relationship to the real per capita GDP. This result confirms the results of a previous study of Sri Lanka. (Subrata, 1997) found a positive relationship between real interest rates and GDP growth. In addition, a positive relationship with interest rates is consistent with the results of (LIANG & TENG, 2006), who focused on China. The positive real interest rate encourages people to save and increases investment in the country. In addition, interest rates increase savings and higher savings enable the banking sector to mobilize more funds for the private sector, helping to increase resource allocation and economic productivity.

The cointegrating financial development relationship also has economically significant coefficients of investments, real interest rate and trade ratio. The coefficient of the investment ratio is negative and significant to the broad money ratio. As per McKinnon's framework on interest rates, money and investments, money and investments are two alternative assets held by the public. Therefore, an increase in one variable can negatively affect the second variable. In addition, the money supply of a country can be independent based on the monetary policy of that country. The real deposit rate has a positive significant effect on the broad money supply. This result is consistent with previous studies, such as that of (Hui Boon & Ahmad Zubaidi, 1999) for Malaysia. For Indonesia, (Masih & Masih, 1996) found a positive relationship of interest rate to the broad money supply. Trade ratio has shown a negative and significant relationship to the broad money supply. Although there is widespread evidence that financial development and trade openness have a positive relationship, the results of this study contradict those findings. Further research to be carried out to confirm this situation.

Two dummy variables are included in the VECM as exogenous variables. One is for the open economic policy. The open economic dummy has a negative significant effect on real per capita GDP, which is unexpected. The reason behind this result may be the effect of the exchange rate. Before introducing the policy of the open economy, the value of the local currency was stable. However, after introducing the policy of the open economy, the value of the local currency decreased. At the same time, for the money supply relationship, the dummy variable for the open economic policy is positive and significant, as expected based on empirical evidence. And the dummy variable for external shocks shows a negative effect on GDP and money supply as per economic theory, but it is not significant for GDP.

Error correction coefficients for both GDP and money supply relations are negative and significant, as expected based on the theoretical and empirical evidence. The negative coefficient indicates that both equations are in the higher level of the equilibrium, and the imbalances will be corrected by the error correction coefficients. Imbalances in the GDP relation will correct according to the error correction at a speed of 4.30 percent annually. This rate is quite low when

compared with Indonesia (Masih & Masih, 1996), which shows 79 percent correction, while Malaysia shows 57 percent (Hui Boon & Ahmad Zubaidi, 1999) and China 22 percent (LIANG & TENG, 2006). (Rousseau & Vuthipadadorn, 2005) found that error correction for GDP is 8.8 percent for Sri Lanka when applied in ten Asian economies. The speed of error correction in relation to the money supply equation is 1.3 percent annually. (Korhonen, 1998) estimated an 8.2 percent speed of adjustment for Russia. When compared to the unusual 275 percent for Malaysia (Hui Boon & Ahmad Zubaidi, 1999), the estimation of this study is acceptable.

Some of the short-term coefficients of the VECM results are significant. The non-significance of any of the differenced variables, which reflect only a short term relationship, does not involve a violation of theory (Masih & Masih, 1996).

As per the results of the Granger causality test, the broad money supply affects the GDP in the short term at a 5 percent significance level. This means that financial development affects the economic growth of Sri Lanka. The results of this relationship are different among empirical studies, as follows:

Study	Country	Relationship
(LIANG & TENG, 2006)	China	Unidirectional causality from economic growth to financial development
(Chang & Caudill, 2005)	Taiwan	Unidirectional causality from financial development to economic growth
(Abu-Bader & Abu-Qarn, 2008)	Egypt	Bidirectional causality between financial development & economic growth
(Subrata, 1997)	Sri Lanka	Positive effect of financial liberalization on economic growth
(Arestis et al., 2002)	Philippines	? (no relation)

For the robustness of the estimation, different samples were employed in the estimation. Estimation results are quite similar among these samples despite some differences in significant levels and magnitude. But, there is a change in the long-term cointegration in the year 2003. When reducing sample sizes beyond 2003, there is only one cointegrating relationship among variables. The reason may be statistical or economical. When considering the monetary policy of Sri Lanka, there are some policy changes that could explain this phenomenon. As per the annual report of the CBSL (2003), the following changes occurred.

1. The CBSL reduced policy rates, expecting a decline in the borrowing requirements of the government and for other reasons.
2. The CBSL moved toward more open-market-oriented operations, enabling it to manage market liquidity more effectively; daily auctions were introduced, enabling the market to determine the interest rate. As a result, the CBSL could absorb excess liquidity on a long-term basis, which reduced transaction cost of commercial banks.

3. More transparent financial reporting system was introduced; monthly reports on money releasing (advance release calendar) was started.

The VECM is estimated with DLR instead of the M2 ratio for the periods of 1952 – 2001 & 1952-2014 to compare with (LIANG & TENG 2006). The investment ratio has significant results for the sample of 1952-2001, and all variables are significant for the sample 1952-2014. Time series analyses are sensitive to the sample size. When comparing short-term Granger relationships, the results of this study are consistent with the main result of the study; financial development affects economic growth. But, China has a reverse relationship. There is a difference in results between the two countries, which may be due to the differences in economic structures between the two countries.

6. Conclusion and policy implications

6.1 Conclusion

This study examined the relationship between financial development and economic growth in Sri Lanka using time series data from 1952 to 2014, employing Vector Error Correction methodology. The following research questions were investigated to develop policies to enhance economic sustainability through better financial management:

1. What are the factors affecting to the long term financial development and economic growth in Sri Lanka?

2. How is the short term relationship between financial development and economic growth in Sri Lanka?

3. What are some significant policy implications and suggestions for the financial sector in Sri Lanka?

Investment ratio, interest rate and trade ratio are the macroeconomic variables affecting to the long-term financial development and economic growth in Sri Lanka. The investment ratio and trade ratio negatively affect the real per capita GDP and broad money supply in Sri Lanka as per the findings of this study. In addition, the deposit interest rate in real terms shows a positive relationship with both real per capita GDP and broad money supply.

The error correction coefficient of the GDP relationship is -0.0430, which indicates that the long-term equilibrium of the GDP is above the level of the equilibrium, and the error correction coefficient brings it to the equilibrium at an annual rate of 4.3 percent. The error correction coefficient of the broad money ratio relationship is -0.3693, indicating that imbalances in the equilibrium level of the broad money supply will correct at a rate of 36.93 percent annually, using the error correction coefficient.

The lagged differenced broad money supply affects the current difference in the broad money supply in the short term. This means that financial development affects economic growth in Sri Lanka. This result remains consistent when estimating with the deposit liabilities ratio.

6.2 Policy implications

Based on the findings of this study, this paper offers some policy implications to improve financial development and maintain sustainable economic development in Sri Lanka. Monetary authorities should set policies to further develop the financial sector, as this sector produces economic growth. This development could take the form of an increase in the competitiveness of the financial sector, an increase in the density of the financial sector, an increase in human resources, or an increase in the usage of new technology in the financial sector; or it could be done by creating a user friendly environment for customers (by making the process simple and more transparent). The financial market in Sri Lanka needs to improve efficiencies to meet the standards of the international financial market. The interest rate channel should be used to increase the broad money supply and GDP.

The open economic policy has significant effect on money supply, and money supply affects the economic growth in the short term. Therefore, policy makers should consider about the time range in making policies. Further research needs to be carried out with regard to the long-term relationships.

6.3 Suggestions for future study

This study aims to examine the relationship between financial development and economic growth using five variables. As mentioned in the section on limitations, some suggestions can be made for future studies. There are other macroeconomic variables that may affect money supply and GDP. Future studies could employ those omitted variables and fiscal policy impacts, and quarterly or monthly data should be used for those estimations. In addition, structural breaks should be considered in future studies. At the same time, this study could be performed using different methodologies to confirm its results.

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Appendices

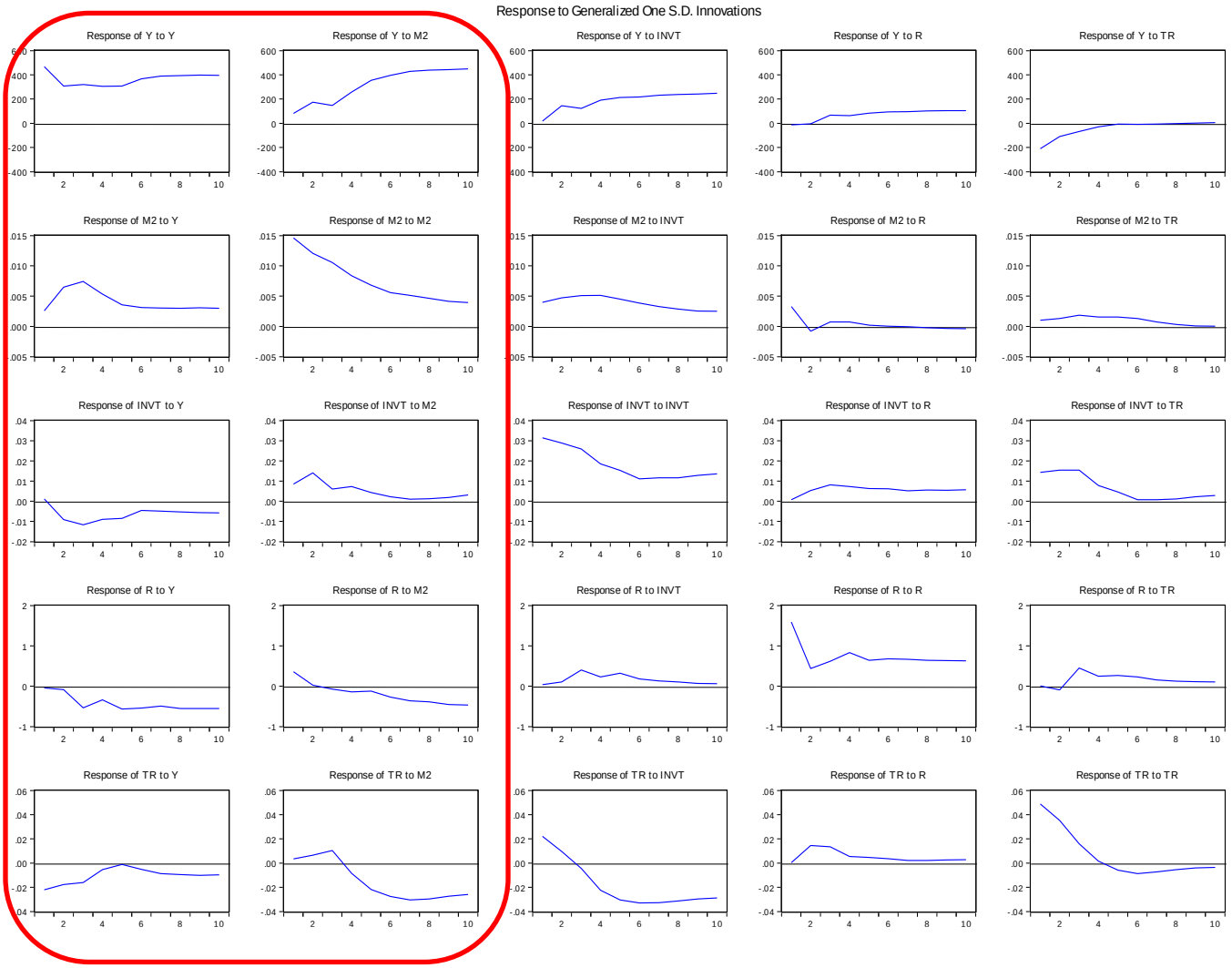
1. Summary of the variables and data sources

Variable	Data	Description	Source
Y	Real Per Capita GDP	Real GDP/mid-year population	GDP: Central Bank of Sri Lanka Population: Dept. of Census and Statistics
M2	Broad money supply	Real M2/real GDP	Central Bank of Sri Lanka
INVT	Investments	Real investments/real GDP	Central Bank of Sri Lanka
R	Deposit interest rate	Deposit interest rate – inflation rate	Interest rate: Central Bank of Sri Lanka inflation rate: Dept. of Census and Statistics
TR	Imports and exports	Real imports + real exports / real GDP	Imports & exports: Ministry of Finance GDP: Central Bank of Sri Lanka
OPEN	Dummy variable	Dummy variable for open economic policy after 1977	After 1977 1, otherwise 0
EXT	Dummy variable	Dummy variable to capture external shocks	1973: oil price shock, 1997: Asian financial crisis, 2001:

			9/11 attack in USA, 2005-2008: increase in oil price = 1, otherwise 0

2. Impulse response function

The simulation in this generalized impulse response function covers 10 years. The effects of one standard deviation innovation in current and future values of the model are presented.



Appendix 3. Results of comparison of different samples

	1952-2014		**1978-2014**		**1952-2003**		**1952-2001**
	Coin. Eq.1	Coin.Eq.2	Coin.Eq.1	Coin.Eq.2	Coin. Eq. 1	Coin. Eq. 2	Coin. Eq.

Y(-1)	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000	
M2(-1)	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000	48745.81*** (0.0011)
INVT(-1)	153334.0*** (0.000029)	0.6389*** (0.00183)	22411.99* (0.0717)	0.1379 (0.4306)	37956.74* (0.1058)	-0.1766** (0.0371)	-3174.461 (0.5905)
R(-1)	-1998.93*** (0.00064)	-0.0072** (0.02853)	-306.82** (0.0397)	0.0028 (0.1809)	-276.5583 (0.6462)	0.006445*** (0.0041)	543.6523*** (0.0027)
TR(-1)	78761.05*** (0.00001)	0.3821*** (0.00001)	-6106.08* (0.1084)	-0.238*** (0.00008)	55228.19*** (0.00001)	0.059135* (0.0630)	16839.21*** (0.00001)
OPEN	-1214.48*** (0.0003)	0.0301*** (0.0032)	-	-	-1019.80*** (0.00201)	0.02655*** (0.0019)	-233.75 (0.5286)
EXT	-90.595 (0.6553)	-0.0130** (0.0444)	14.4613 (0.9659)	-0.0122 (0.2452)	-107.7447 (0.7519)	-0.02085** (0.02127)	113.53 (0.7734)
C	-76929.37	-0.6188	-3445.16	-0.1897	-45288.37	-0.30796	-31991.21
Error Correction	-0.043003** (0.0422)	-0.369*** (0.0006)	-0.3833*** (0.00009)	-0.2912* (0.1094)	0.016464 (0.4161)	-0.50930*** (0.00008)	0.049497 (0.4804)
Sample size	63		38		53		51

Note: P values are in parentheses, significance level: *=10%, **=5% & ***=1%