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P. D. C. S. Dharmadasa

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Short and Long Term Determinants of Bank Credit Growth in Sri Lanka

P.D.C.S. Dharmadasa[a]

[a] Department of Economics, Faculty of Social Sciences, University of Kelaniya, Sri Lanka

ABSTRACT

The Purpose: The aim of this paper is to identify the determinants of credit growth of commercial banks in Sri Lanka during the period from 2008 to 2019.

Design/ methodology/approaches: The analysis consists of macro-level data collected from monthly basis including bank-specific, macroeconomic, and monetary policy variables that affect credit growth. Co-integration test is conducted using Autoregressive Distributed Lag (ARDL) approach to determine the long-term determinants of credit growth.

Findings: The results revealed that growth of money supply, non-performing loan ratio, lending rate, and inflation rate and efficiency ratio have a strong link with credit growth compared to other bank-specific variables, and therefore they can be considered as long term determinants of commercial banks' credit growth in Sri Lanka. The findings further revealed that growth of GDP and credit growth tend to have a relationship which supports the 'demand following' hypothesis of finance-growth theory. All other bank specific variables indicated marginal impact on the credit growth in the short-run.

Policy implications: The results suggested that the government should prioritize all growth promoting policies, because, low economic growth disturbs aggregate demand in the country. To achieve a desired growth, continuation of expansionary monetary and fiscal policies is necessary with a close coordination between them. Continuation of the monetary targeting framework of the CBSL is also necessary since money supply growth influences credit growth in the country.

Originality: This research is expected to be a pioneering work in the field as studies focusing especially on credit growth are relatively limited in the Sri Lankan setting.

KEYWORDS

Credit growth, ARDL approach, Co-integration, Demand following hypothesis

JEL CLASSIFICATION

E51, E53

I. Introduction

Credit exchange relations in the marketplace, according to Karl Marx, take two forms, namely, commercial credit relation and the monetary credit relation. The former explains buying commodities against a promise to pay, and the latter explains lending money with a view of earning interest. This, on the other hand, implies a movement of interest-bearing capital in which it is determined by the demand and supply of interest-bearing capital (Lapavitsas, 1991). The analysis of this paper is built around the second relation of credit, which is banks' monetary credit, as it plays a significant role in the process of economic growth and development.

Generally, banks provide a significant amount of capital to both public and private sectors in the form of loans and therefore, the status of banks credit indicates the collective health of the markets and the economy. Since credit given to individuals and institutions is often converted into capital, and thereby used for productive economic activities, the growth of the credit market may also indicate growth of productive economic activities. Some economies therefore enhance credit growth as a catching-up strategy because easier access to credit paves the way to achieve their developmental targets (Bayoumi and Melander, 2008).

CONTACT Dharmadasa P. D. C. S. champikas@kln.ac.lk Department of Economics, Faculty of Social Sciences, University of Kelaniya, Sri Lanka
[1]The author gratefully acknowledges comments and suggestions given by Professor O. G. Dayaratna-Banda

Even though it is argued that credit supply often spurs economic growth as it indicates mobilization of savings into investments, a rapid growth of credit also raises concerns on prudential risks; as it decreases loan quality, increases systemic risks, and deteriorates bank soundness (Igan and Pinheiro, 2011). Excessive credit growth may contribute to increase the systemic risks that dampens financial stability, and thereby propagate banking crises (Bernanke and Blinder, 1988; Bernanke and Gertler, 1995; Allesi and Detken, 2014). This conflicting dual role of credits in the economy has become an attractive research area recently. This has been further fueled by the global financial crisis in 2007/08, which has shown the consequences of unregulated excessive credit growth. The global financial crisis let everyone realize that maintaining sustainable credit growth is an important exercise.

In addition, some researchers have asserted that low levels of credit are also harmful to the economic activities of a country (Werner, 1997). Credit constraints may have contributed to the low rates of capital formation, which on the other hand, lead to low productivity growth (Moreno-Brid, Rivas, and Santamaría, 2005; Moreno-Brid and Ros, 2009, 2010; Ros, 2013a, 2015). At present, Sri Lanka is experiencing such a situation as credit supply is showing a declining trend, which is harmful to the economic survival of the country. During the last couple of years, the Central Bank of Sri Lanka (CBSL) has taken various measures to boost the credit supply of the banking sector, which has been showing sluggish growth due to various macroeconomic challenges such as rising international commodity prices, depreciation of domestic currency, tax changes, and unfavorable weather conditions that devastated the agricultural sector and disrupted economic activities (CBSL, 2017). As stressed by CBSL, banks' lending volume to agricultural and industry sectors dropped by a considerable amount while showing improvement in the services sector. The prime lending rate of banks fluctuated in between 13 percent to 14 percent during 2016 to 2019 representing monetary tightening policy of the Central Bank (CBSL, 2017). As a result, profits of banks dropped dramatically, dampening the country's economic growth. In order to address these issues, CBSL has relaxed monetary tightening and has implemented an accommodative monetary policy while the government has adopted a favorable fiscal policy to boost economic activities. These efforts have resulted in increasing the deposit rate of commercial banks from 8.4 percent to 11.25 percent and the lending rate has dropped from 12.9 percent to 10 percent by the end of the second quarter of 2019 (CBSL, 2020). However, the expected credit growth could not be achieved except for a little improvement that happened at the end of 2019. Nonetheless, CBSL has been continuing its accommodative monetary policy for stimulating the economy that has been devastated by the Covid-19 pandemic. CBSL further reduced interest rates so that the lending rate further dropped to 9 percent (refer Figure 1).

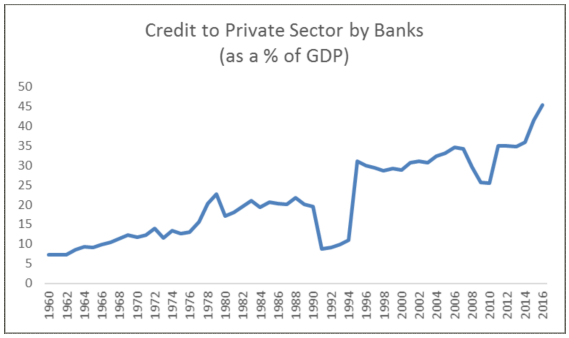

Figure 1. Private Sector Credit provided by the banking sector.
(Source: Authors estimation the data from the Annual Reports of the CBSL)

Since it is also evident by the literature that low levels of credit hamper economic activities of a country, concern over banks' credit growth sustainability in Sri Lanka is a timely endeavor. To maintain sustainability, identifying the sources of credit growth is imperative. Therefore, this paper aims to identify the sources of banking sector (commercial banks) credit growth in Sri

CONTACT Dharmadasa P. D. C. S. champikas@kln.ac.lk Department of Economics, Faculty of Social Sciences, University of Kelaniya, Sri Lanka
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Lanka, which would be a pioneering work in the field, as studies focusing especially on credit growth are relatively limited in the Sri Lankan setting.

The paper brings a comprehensive empirical analysis utilizing both supply and demand side factors that affect credit growth of commercial banks using Autoregressive Distributed Lag (ARDL) approach for co-integration proposed by Pesaran et al. (2001). In practice, testing the relationship between variables in the ARDL model, leads to a hypothesis testing of a long-run relationship among those variables1. At present, this method is one of the best estimation methods for analyzing the long-term relationships among macroeconomic variables. On the other hand, it is relatively an underutilized method in the Sri Lankan context for empirical examinations; therefore, it would be a new addition to the existing literature related to banking sector studies in the Sri Lankan context.

The remainder of the paper is organized as follows. In section 2, the paper sheds light on the relevant theoretical and empirical literature and hypothesis development. Section 3 illustrates the data and the methodology utilized to achieve the desired objective of the paper. The empirical results are presented and interpreted in section 4. Finally, the conclusions are presented in section 5.

II. Literature Review and Hypotheses development

Theoretical Background

There are numerous theoretical and empirical studies on the determinants of credit growth. As emphasized by the credit theory of money, which is one of the most discussed theories in history, creation of loans by the banks is considered as the growth of credit (Mitchell-Innes, 1914). This theory holds two common strands, in which the first emphasized the idea that money originated as a unit of account for debt, and the second emphasized the position that money creation involves the simultaneous creation of debt. Credit creation theory of banking emerged under this context, in which it emphasized that banks have the ability of creating loans using deposits. The amount of credit created by banks is considered as a part of money supply in the country. Thus, the total money supply of a country consists of the money printed by the central bank and the amount of money/credit created by the commercial bank of that country (Werner, 1997). The rise of the one item causes an increase in the country's money supply.

As mentioned earlier, availability of credit, on the other hand, spurs economic activities of a country. In this context, banks' intermediary activities that explain the supply of funds to the deficit sector through accepting deposits from the surplus sector play a significant role. Schumpeter (1911) has asserted that a well-functioning financial system is necessary to boost the real sector, which ultimately enhances economic growth. This notion has become a debatable issue in finance-growth literature leading to the creation of two main hypotheses on the link between credit/money supply and economic growth, namely, the supply leading hypothesis and the demand following hypothesis. Supply leading hypothesis emphasizes that a well-developed financial system spurs economic growth. This notion was supported by McKinnon (1973) and Shaw (1973) asserting that a well-developed financial system reduces transaction costs and information asymmetry, and therefore it enhances economic growth. A voluminous empirical support was received for this hypothesis including the work of Banerjee and Ghosh (1998), Levine (1998), Choong, Yusop, Law and Sen (2003). On the contrary, the demand following hypothesis, pioneered by Robinson (1952), asserted that financial development comes from growth of the

[1] Detailed discussion on ARDL approach is given in Section 3 of this paper.

economy. Economic growth expands economic activities, which leads to the development of financial activities (Singh, 1999). However, Patrick (1966) has shown through his stage of development hypothesis that in the early stage of development, countries experience supply-leading patterns, however that fades away and shifts to demand-following patterns in later stages.

Nonetheless, there has been a general lack of macroeconomic theories on the determinants of banking sector credit until Werner (1992, 1997) introduced quantity theory of credit, explaining how money can link to the economy. His argument relied on the basis that a substantial proportion of money is used for transaction purposes. Thus, two types of money consist of quantity theory of money i.e. money used for GDP transactions (real circulation) and money used for financial transaction (financial circulation). Based on this concept, he expanded Fisher's quantity theory of money into quantity theory of credit giving special attention to the asset flow and the role of banks. According to Werner (1992, 1997), 97 percent of a country's money supply comes from banks and only 3 percent from the central bank. He asserted that banks contribute to printing money by creating credit. This argument is supported by Schumpeter's view that "…it proved extraordinarily difficult for economists to recognize that bank loans and bank investments do create deposits. In fact, throughout the period under survey they refused with practical unanimity to do so" (Schumpeter, 1954).

Werner (1997) further argued that shrinking or booming of credit creation leads to destabilization of the economy through recessions or banking crises. The recession in Japan in the 1990s was due to the shrinking of credit creation, whereas banking and currency crises that occurred from time to time, including the global financial crisis in 2007, were due to speculative credit creation. Thus, credit creation of banks and lending channels are far more important than other counterparts that affect economic growth and development. Therefore, Werner asserted that quantitative measures (rules) should be used as the main policy tools to move the economy. In this setting, proper management of interest rates and money supply is mandatory as he asserted. Since prices are the key determinants of aggregate demand, maintaining stable prices is also important. Similar arguments of Kashyap and Stein (1995), Stein (1998) and Walsh (2003) are also noteworthy here.

Since it has shown the consequences of banks' credit growth through recent financial crises and institution bankruptcies, proving the validity of related theories, many empirical works have focused on finding the determinants of banks' credit growth and thereby suggest alternative ways of maintaining a sustainable credit level, based on their macroeconomic environment. The subsequent section presents the existing comprehensive empirical analysis on that matter.

Empirical Evidence and hypothesis development

Empirical literature on the link between credit supply and finance-growth is voluminous. However, macro-level research on the determinants of credit supply and credit growth is limited, while there exists a considerable amount of micro-level studies. Most micro level studies have utilized panel data and fixed effect regression method to examine the determinants of credit growth. As shown by Awdeh (2016), deposit growth, GDP growth, inflation, and money supply tend to boost bank credit in the resident private sector in Lebanon. Conversely, credit risk, lending interest rate, treasury bills rate, public borrowing, and remittance inflows tend to decrease loan growth. A study with reference to Latin America done by Hansen & Sulla (2013) has shown that credit growth posed risks to macroeconomic and financial stability in Brazil, Paraguay, Venezuela, and Colombia indicating the vulnerability in the assets side of the banking sector. In addition, a study in Montenegro has found that positive economic development and an increase in banks' deposit potential led to higher credit growth (Ivanovic, 2016). It also revealed that

the soundness of the banking system is decisive for promoting lending activities of banks, while weakening of balance sheets of banks in terms of high non-performing loans and low solvency ratio tend to have a negative effect on credit supply.

A wide array of literature is observable with reference to European countries. In an empirical study using error correction approach to co-integration, Calza et al. (2001) have shown that domestic credit is positively related to real GDP growth in the long-term, while it has shown a negative relationship with short-term and long-term real interest rates in the EU area. In addition, by investigating the determinants of domestic credit to the private sector in 11 emerging European countries, Égert et al. (2006) have shown that credit to the public sector, nominal interest rates, inflation rate, and the spread between lending and deposit rates are the major determinants of credit growth in the CEE-5, while GDP per capita is the only important factor for the Baltic and South-Eastern European countries. Cucinelli (2015) investigated the inter-temporal relationship between bank lending behaviour and credit risk in Italy with a focus on the impact of non-performing loans (NPL) and loan loss provision. The study found that the credit risk of previous years has a negative impact on bank lending behaviour. For instance, Cottarelli et al. (2005) in a study that focused on a large panel of non-transition developing and industrialized countries have shown that bank lending is positively related to GDP per capita and financial liberalization, while it is negatively affected by public debt. Bustamante et al. (2019) examined how the role of bank-specific characteristics such as bank size, liquidity, capitalization, funding, revenue, and profitability affect the supply of credit in domestic and foreign currency in Peru. The study found that well-capitalized, high-liquidity, low-risk, and more profitable banks tend to grant more credit, especially in domestic currency. It also found evidence to show that reserve requirements, both domestic and foreign currency, are effective in curbing domestic credit in Peru.

In Sri Lanka, a comprehensive study on macroeconomic determinants of credit growth of banks does not exist. However, a number of studies that addressed the economic impact of credit growth in general are available. For instance, Perera (2017) has conducted a sectoral analysis to find the impact of credit intensity on economic growth. The study has found evidence in support of the demand following hypothesis of finance-growth nexus. The study also found a sectoral heterogeneity in responses to credit impulses. Muthusamy et al. (2018), on the other hand, have analyzed the economic impact of sectoral distribution of commercial bank credit. They found that loans supplied to the industry sector generated positive growth effects, while other sectors have not shown a significant effect. Thus, they confirmed that the promotion of lending by the government to the industrial sector has a long-term positive growth effect in Sri Lanka.

It is clear that all empirical studies related to Sri Lanka have focused on the effects of credit growth, and there is only a dearth of studies on the factors determining the growth of credits of banks in Sri Lanka. Therefore, carrying out such research is essential in Sri Lanka setting. As mentioned in the introductory section of this paper, the credit supply of Sri Lankan banks shows a declining trend, and on the other hand, economic growth is also at a low rate at present. Therefore, identifying the sources of credit growth is important to find remedies for declining credit growth or curb down if there is unsustainable credit overgrowth. Thus, the main hypothesis is going to test in this study is;

H_1: There is a long-term relationship between banking sector credit growth and the chosen explanatory variables (bank specific, macroeconomics and monetary policy variables) of the study.

A detailed discussion on the theoretical base and possible reasons for the choice of the variables in the aforementioned three

categories is given in the subsequent section of this paper.

III. Methodology

Data

This study considers the banking sector in Sri Lanka for empirical analysis. For all variables, quarterly data from 2008 to 2019 have been collected from the Central Bank's data library of Sri Lanka and from www.indexmundi.com. As data for some variables were available on a monthly basis, they were converted to quarterly data using frequency converter in EViews statistical software in order to be compatible with the other data in the sample. The foremost reason for the choice of the sample period is that it includes the period that started the global financial crisis and the aftermath. On the other hand, it includes significant events that took place in the country, i.e. the end of the civil war, several key elections and the social crisis due to Muslim extremists' attack in Sri Lanka. The study assumed that the results of the analysis would facilitate better predictions on banking behavior in Sri Lanka by taking such a time period into account.

Measurements of variables

Dependent variable: Growth of domestic credit in the commercial banking sector (DC) is considered the dependent variable of the model.

Explanatory Variables: According to existing theoretical and empirical literature, as lending of banks is determined by various factors (Werner, 1997; Awdeh, 2016; Cottarelli et al., 2005), a number of independent variables have been chosen considering the data availability of each variable in Sri Lanka. Based on existing literature, the paper use three categories of explanatory variables including bank specific variables, macroeconomic variables, and monetary policy variables. Following variables have been taken as explanatory variables under each category:

Bank specific variables: Capital Adequacy Ratio (CAR) which is the indicator of a bank's soundness measures the bank's risk weighted credit exposure. This is a good indicator in terms of how well a bank can sustain a reasonable loss (Van den Heuvel, 2001b; Kishan and Opiela, 2000). Return on Equity Ratio (ROE) is used to assess returns on banks initial capital, which in turn is embedded in their net income. This indicates profitability of banks, which, according to existing literature, is a good indicator of a bank's performance regarding credit (Kashyap and Stein, 2000; Chernykh and Theodossiou, 2011). In addition, efficiency ratio (EFI) is utilized following Berger and Mester (1997) as banks with higher credit volume indicate profit efficiency of banks. Moreover, non-performing loan ratio (NPL) is utilized as a bank specific variable for understanding loan performance of banks (Tomak, 2013).

Macroeconomic variables: GDP growth rate (GDP) that indicates economic growth of the country, which is assumed to be a direct source of credit growth according to the proponents of demand-following hypothesis is included as an explanatory variable (Robinson, 1952; Kuznets, 1955; and Lucas, 1988). Inflation (INF) is used as prices are the key determinants of aggregate demand (Werner, 1997; Ivanovic, 2016; Calza et al., 2001).

Monetary Policy Variables: Growth rate of money supply (MS), which is also assumed to be a direct source of credit growth, is also used since an increase in money supply enhances banks' capacity of credit creation which boosts credit growth. In addition, commercial banks' lending rates (LR) is also used as an explanatory variable. Both these variables are considered under quantitative monetary policy tools of the central bank that manages credit growth (Werner, 1997; Awdeh, 2016).

Method of Analysis

It is a long standing practice in economics to use co-integration method when conducting time series analyses to identify the long term relationship among variables and therein to determine what factors are most influential

among them. Since the objective of this paper is to examine the long run relationship, the use of a co-integration test is justified. This paper has used the autoregressive distributed lag (ARDL) model proposed by Pesaran et.al. (2001), which is a widely used method for testing co-integration, for empirical assessments. This method has been designed to overcome the issues related to the order of stationarity of the variables specified, since the other existing co-integrations tests, i.e., probability test of Stock and Watson (1988), co-integration test of Johanson (1991), and residual based test of Angle and Granger (1987) require that the utilized variables should have a common order of integration. In order to get a common order of integration, differentiation is needed for some data, which lower their actual potency of influence, which on the other hand leads to spurious results. However, the ARDL approach can be used irrespective of whether a series is at its level - $I(0)$ or whether it has a first order integration - $I(1)$, or a combination of both. In addition, an unrestricted error correction model can also be derived from an ARDL bound testing method through a simple linear transformation of the model, which contains both short-run and long-run dynamics. Therefore, utilizing the ARDL approach is more advantageous than the other co-integration tests.

Accordingly, the ARDL model can be stated as follows:

$$Y_t = a_0 + a_1 t + \sum_{i=1}^{p} \varphi Y_{t-i} + \beta^{'} X_t + \sum_{i=0}^{q-1} \beta_1^{*} \Delta X_{t-i} + u_t \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

$$\Delta X_t = P_1 \Delta X_{t-1} + P_2 \Delta X_{t-2} + \ldots\ldots + P_s \Delta X_{t-s} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

where, Y is the dependent variable and X_t is the k dimensional $I(1)$ variables which are not co-integrated among themselves, u and ε are serially uncorrelated disturbances. Based on the above model, the following ARDL model is specified for estimation:

$$\Delta CRD_t = \alpha_{10} + \alpha_{11} CRD_{t-1} + \alpha_{12} GDP_{t-1} + \alpha_{13} INF_{t-1} + \alpha_{14} MSG_{t-1} + \alpha_{15} LR_{t-1} + \alpha_{16} CAR_{t-1}$$
$$+ \alpha_{17} NPL_{t-1} + \alpha_{18} ROE_{t-1} + \alpha_{19} EFI_{t-1} + \beta_{11} \sum_{i=1}^{p} \Delta CRD_{t-i} + \beta_{12} \sum_{i=o}^{p} \Delta GDP_{t-i} + \beta_{13} \sum_{i=0}^{p} \Delta INF_{t-i}$$
$$+ \beta_{14} \sum_{i=0}^{p} \Delta MSG_{t-i} + \beta_{15} \sum_{i=0}^{p} \Delta LR_{t-i} + \beta_{16} \sum_{i=0}^{p} \Delta CAR_{t-i} + \beta_{17} \sum_{i-0}^{p} \Delta NPL_{t-i} + \beta_{18} \sum_{i=0}^{p} \Delta ROE_{t-i}$$
$$+ \beta_{19} \sum_{i-i}^{p} \Delta EFI_{t-i} + \varepsilon_1 \ldots.(3)$$

Where, α corresponds to the long run relationship, while β represents the short-run dynamics of the model. Based on this equation, the following null and alternative hypotheses are developed.

H_0: $\alpha_{11} = \alpha_{12} = \alpha_{13} = \alpha_{14} = \alpha_{15} = \alpha_{16} = \alpha_{17} = \alpha_{18} = \alpha_{19} = 0$ (null hypothesis -No co-integration among variables)

H_1: $\alpha_{11} \neq \alpha_{12} \neq \alpha_{13} \neq \alpha_{14} \neq \alpha_{15} \neq \alpha_{16} \neq \alpha_{17} \neq \alpha_{18} \neq \alpha_{19} \neq 0$ (alternative hypothesis - Co-integration among variables)

The decision is made based on the above criteria such that, if we reject the null hypothesis, it is assumed that there is co-integration and vice versa. The F-statistic is carried out on the joint null hypothesis that the coefficient of lagged variables is zero. If the long run co-integration among variables is found (F- statistic is greater than Pesaran et al. (2001) critical upper bound values[2], then the error correction version of ARDL model utilized for testing of short run dynamics. The short run dynamics in the above equation can be explained by the following specification:

$$\Delta CRD_t = \beta_{10} + \beta_{11} \sum_{i=1}^{p} \Delta CRD_{t-i} + \beta_{12} \sum_{i=o}^{p} \Delta GDP_{t-i} + \beta_{13} \sum_{i=0}^{p} \Delta INF_{t-i} + \beta_{14} \sum_{i=0}^{p} \Delta MSG_{t-i} + \beta_{15} \sum_{i=0}^{p} \Delta LR_{t-i}$$
$$+ \beta_{16} \sum_{i=0}^{p} \Delta CAR_{t-i} + \beta_{17} \sum_{i=0}^{p} \Delta NPL_{t-i} + \beta_{18} \sum_{i=0}^{p} \Delta ROE_{t-i} + \beta_{19} \sum_{i=0}^{p} \Delta EFI_{t-i} + \mu_{11} ECM_{t-1} + \eta_1 \ldots\ldots\ldots(4)$$

The one year lagged ECM term measure the speed of adjustment towards the equilibrium, which on the other hand interpret as the speed of regulation from the short run to the long run. Thus, the equations (3) and (4) are estimated using the ARDL estimation method.

[2]As given in Pesaran et al. (2001), critical upper bound value of F- statistic is 5.06, 4.01 and 3.52 for 99%, 95% and 90% confidence level respectively.

IV. Findings and Discussion

The analysis in this section is conducted in several stages. First, the descriptive statistics and the results of the normality test are presented. Second, the results of the unit root test for identifying the stationary nature of variables are presented. The third section analyzes the results of the estimation of the ARDL model to understand the short term and the long-term behavior of the chosen determinants of credit growth. Finally, the results of the stability test are discussed to explain whether the utilized model is stable.

Descriptive Statistics

Descriptive statistics which measures the suitability of data in the sample indicated 47 observations. The measures of central tendency which is indicated by the mean and the median, shows that they are almost similar in each variables emphasizing the symmetric distribution of data. These results have further confirmed by the statistics of the skewness and the kurtosis as well. The standard deviation, which measures the data spread (or the dispersion), on the other hand, indicates that inflation (INF) and credit growth (CRD) have a higher spread compared to the other variables in the sample. In addition, all other data spread within 3 standard deviation on each side of the mean, emphasizing the normality of the data. Further, the probability value of the Jarque-Bera test ($p>0.01$) indicates that all variables are normally distributed. The results are shown Table 1.

Table 1. Descriptive Statistics

	CRD	DR	CAR	EFI	LR	NPL	ROE	MSG	INF	GDPG
Mean	40.69	8.277	15.419	51.055	11.138	4.822	16.649	3.543	122.29	5.506
Median	37.07	8.383	15.500	51.700	11.126	4.300	16.400	3.866	124.78	6.100
Maximum	54.63	13.39	17.200	57.900	23.545	8.800	27.200	4.807	155.69	8.600
Minimum	30.38	5.705	13.100	42.400	6.0156	2.500	10.100	0.816	86.832	1.100
Std. Dev.	7.54	1.721	0.975	3.3814	3.3998	1.743	3.568	0.948	21.009	2.196
Skewness	0.58	0.568	-0.404	-0.350	1.357	0.745	0.49	-1.398	-0.033	-0.251
Kurtosis	2.048	3.300	2.799	2.934	3.095	2.718	3.522	3.157	1.745	1.846
Jarque-Bera	4.48	2.699	1.358	0.971	3.187	4.509	2.414	17.930	3.095	3.104
Probability	0.11	0.259	0.507	0.616	0.124	0.105	0.299	0.128	0.213	0.212
Observations	47	47	47	47	47	47	47	47	47	47

Source: Author's own estimation,* value of coefficient rounded up to 3 decimal points to save space

It is therefore clear that the utilized sample and data are suitable for testing co-integration among variables as the collective properties of the element of data sample do not convey any issues.

Unit Root test

It is a standard practice in economics to check the stationarity of variables in the selected sample before conducting any statistical test, as the presence of unit root provides spurious results. However, ARDL method can be utilized regardless of the order of integration of variables, unless otherwise they display a second order integration – I(2). Therefore, in order to test that precondition, Augmented Dickey-Fuller (ADF) test was carried out for the selected variables. The lag length was decided using Schwarz information criterion and the results have shown that EFI, LR and NPL are stationary at their levels and all the other variables, became stationary after their first difference (refer Table 2).

These results confirm the suitability of utilizing the ARDL method for estimation, as the results did not show second order integration in any variable in the sample.

Table 2. Unit Root Test Results

VARIABLES	LEVEL	1ST DIFFERENCE	VARIABLES	LEVEL	1ST DIFFERENCE
CRD	-2.975259	-6.510740**	ROE	-2.634976	-7.291678***
CAR	-2.982310	-8.938160***	MSG	-1.488367	-8.288210***
EFI	-3.211851*	-	INF	-2.855955	-4.678288**
LR	-3.169962*	-	GDPG	-2.668454	-8.275220***
NPL	-4.523007**	-			

Source- Author's own estimation

ARDL Test

Since, the results of the general test of ARDL and the long run bounds test of ARDL are similar as both indicate the long run influence, only the results of the bounds test is presented in the paper. The results show that the bank specific variables tend to have a mixed behavior (refer Table 3). Interestingly, the capital adequacy ratio (CAP) is not a significant determinant of credit growth emphasizing that banks' capital base does not determine their lending capacity in Sri Lanka. While this finding confirms the traditional view which emphasized that capital of banks is an "irrelevant" balance sheet item in determining the credit supply of banks (Friedman 1991, Van den Heuvel 2003), however, it contradicts the hypothesis that highly capitalized banks can help expanding their lending capacity (Stein, 1998).

Nonetheless, profitability of banks, which is represented by return on equity capital (ROE), is strongly significant at 1 percent level (99 percent confident level)[3] in 3-year lag emphasizing that previous years' profit of banks is an influential factor over credit expansion in Sri Lanka. Non-performing loans are a significant positive determinant of credit growth of banks indicating that non-performing loans enhance credit growth in the banking sector in Sri Lanka. These results are consistent with the empirical results of previous studies conducted in other countries (Beck et al. 2015; Amador et al. 2013).

Monetary policy variables tend to have a strong impact on credit growth of banks in Sri Lanka. Growth of money supply, one year lagged, is positive and significant at 1 percent level indicating that growth of money supply is a strong determinant of credit growth of banks. This finding supports the theory of 'lending channel' that asserts that monetary policy enhances the liquidity position of banks, and thereby boosts credit growth (Bernanke and Gertler 1995). This finding is also consistent with previous empirical findings in relation to other countries (Farinha and Robalo 2001; Gozgor 2014; Chen and Wu, 2014). In the Sri Lankan context, the Central Bank has been operating under a monetary targeting framework in which money supply is in control. Accommodative monetary policy practiced by the CBSL tends to inject liquidity to banks from time to time that helps banks to increase their liquidity positions. In addition, adjustments occurring in interest rates also enhance money creation of commercial banks. This is tested by using the prime lending rate as an explanatory variable in the model. The fact that the results on the prime lending rate (LR) of banks is positive and significant at 5 percent level supports the loanable funds theory which emphasizes that an increase in the interest rate tends to curb down credit growth as interest

[3] The level of significance of variables 1%, 5% and 10% indicate that they are significant at 99%, 95% and 90% confident levels respectively.

rate is determined by the supply of loanable funds and the demand for credit.

Table 3. ARDL Estimation Results (Long-Run)

VARIABLE	COEFFICIENT	STD. ERROR	T-STATISTIC	PROB.*
CRD(-1)	0.988317	0.066711	14.81500	0.0000
ROE	-0.119231	0.083236	-1.432438	0.1639
ROE(-1)	-0.073616	0.068951	-1.067654	0.2955
ROE(-2)	0.005016	0.037297	0.134481	0.8941
ROE(-3)	0.157501	0.038059	4.138295	0.0003
CAR	0.198199	0.159881	1.239664	0.2262
CAR(-1)	-0.209096	0.143099	-1.461199	0.1559
EFI	-0.112458	0.069666	-1.614257	0.1185
EFI(-1)	-0.124382	0.059631	-2.085885	0.0469
NPL	0.543291	0.296444	1.832693	0.0804
NPL(-1)	-0.294115	0.330638	-0.889537	0.3833
LR	-0.131720	0.065800	-2.001823	0.0558
MSG	0.059459	0.176512	0.336855	0.7389
MSG(-1)	0.738847	0.192169	3.844771	0.0007
INF	-0.447525	0.098330	-4.551275	0.0001
INF(-1)	0.271461	0.089636	3.028467	0.0055
GDPG	-0.006089	0.067621	-0.090040	0.9289
GDPG(-1)	0.119662	0.060188	1.988131	0.0574
C	26.01201	9.052507	2.873460	0.0080
@TREND	0.316971	0.098344	3.223077	0.0034
R-SQUARED	0.798260	Durbin-Watson stat		2.094520
ADJUSTED R-SQUARED	0.797123	Wald F-Statistic		48.94

Source: Author's own estimation

One-year lag of GDP growth tends to be significant at 5 percent level indicating that economic growth is a strong determinant of credit growth of banks. This finding is consistent with the existing macroeconomic theories on economic growth, which emphasize the pro-cyclical link between economic growth and credit supply of banks. When the economy grows, people tend to start/expand their businesses, increasing the demand for more loans. Banks are also willing to relax their lending criteria and provide more loans regardless of the income/wealth status of the consumers when there is a boom in the economy. This result confirms the 'demand following hypothesis, which emphasizes that economic growth tends to boost credit supply as elucidated by Robinson (1952), Kuznets (1955), and Lucas (1988). This finding is consistent with previous studies that has determined that economic growth tends to enhance credit growth (Calza et al. 2001; Cottarelli et al. 2005; Perera, 2017).

Inflation (INF) tends to be a negative determinant of credit growth as it is significant at 1 percent level in these estimates. This is consistent with the theory that emphasized that higher inflation leads banks to limit their credit and tend to maintain more liquid portfolios (Awdah, 2016). However, past inflation measured by one-year lag is positive and significant at 1 percent level indicating the higher inflation in the previous time period tends to augment credit supply of banks. This result is consistent with the previous empirical findings (Égert et al. 2006; Guo and Stepanyan 2011; Awdah 2016). Two possible macroeconomic implications can be stated in this regard. First, higher inflation tends to lower the real interest rate that in turn reduces the cost of borrowing, and hence, demand for credit increases. Second, since higher inflation

induces cost of living for the people that enhances borrowing, and therefore, demand for loans increases. In the credit market of Sri Lanka, there has been a sharp growth of credits in private sector (refer Figure 1) that accounted for 45.37 in 2016, while the inflation rate has increased from 7.32 in 2011 to 7.7 in 2017 (CBSL, 2019) despite a sharp decline of inflation rate to 3 percent for three years from 2012 to 2013. The results also imply that people in Sri Lanka tend to rely on both past and present inflationary situations when making current decisions.

In order to identify the short run determinants of credit growth of banks, error correction estimations were done using ARDL. Results of the error correction test show the short run behavior of variables (refer Table 3). Results confirmed that there exists a long-run co-integration, which on the other hand confirmed by Wald F-statistics of 48.94, which lays above the upper bound critical value (5.06) of Pesaran et al. (2001). However, the money supply growth and the growth of GDP do not have a significant effect on credit growth in the short-run.

Table 4. ARDL Error Correction Test Results (Short-Run)

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	26.01201	2.128385	12.22148	0.0000
@TREND	0.316971	0.023775	13.33204	0.0000
D(ROE)	-0.119231	0.055812	-2.136298	0.0422
D(ROE(-1))	-0.162517	0.026947	-6.030898	0.0000
D(ROE(-2))	-0.157501	0.029448	-5.348487	0.0000
D(CAR)	0.198199	0.102508	1.933491	0.0641
D(EFI)	-0.112458	0.053146	-2.116024	0.0441
D(NPL)	0.543291	0.190981	2.844744	0.0094
D(NPL(-1))	-0.527469	0.145837	-3.616829	0.0015
D(NPL(-2))	-0.233618	0.139353	-1.676454	0.1078
D(INF)	-0.447525	0.075771	-5.906265	0.0000
D(GDPG)	-0.006089	0.041563	-0.146489	0.8847
*CointEq(-1)**	-0.011683	0.000948	-12.32865	0.0000
R-squared	0.880573	Prob(F-statistic)		0.000000
Adjusted R-squared	0.844383	Durbin-Watson stat		2.094520
F-statistic	24.33201			

Source: Author's own estimation

All other variables tend to have a significant impact on credit growth in the short run. However, they tend to have a slow adjustment towards the equilibrium except inflation and non-performing loan ratio. To check the robustness of the results and the stability of the model, CUSUM and CUSUM square tests were carried out. Results show that the variables tend to be best fit and the model is stable (Figure 2). As shown in Figure 2, both tests fall between the critical boundaries at a 5 percent significance level. Therefore, the data validates the stability and robustness of the model selection. In addition, results of the autocorrelation LM test indicate that there is no serial correlation between selected variables (refer Table 4).

Results of the aforementioned test confirm the stability and normalcy of the chosen model and the variables. Therefore, it can be said that the obtained results through the analysis provide concrete evidence on the determinants of credit growth in the Sri Lankan banking sector.

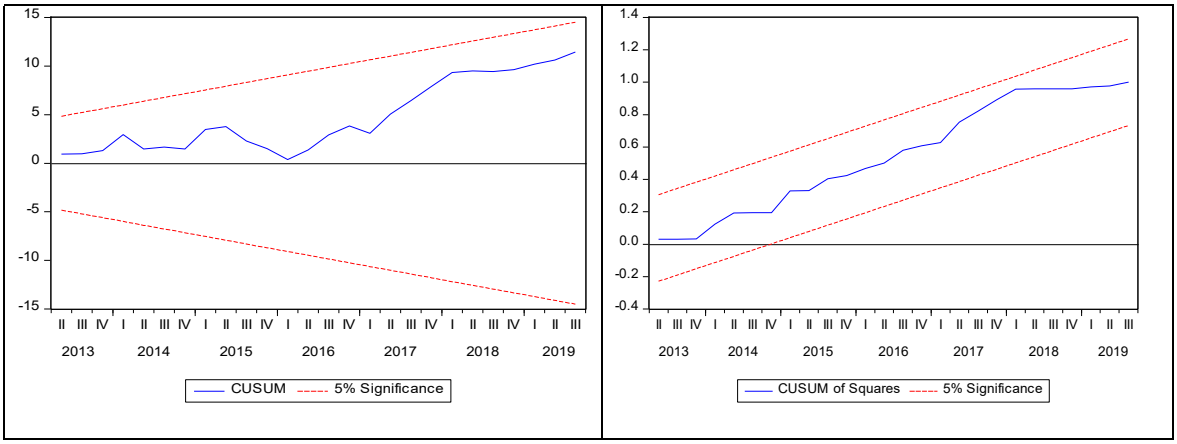

Figure 2. CUSUM and CUSUM Square Test Results

Table 4. Autocorrelation LM Test Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.403916	Prob. F(2,24)	0.6722
Obs*R-squared	1.432798	Prob. Chi-Square(2)	0.4885

V. Conclusions

The objective of this paper was to empirically identify the determinants of credit growth of commercial banks in Sri Lanka. As this is a macro-level study, the results add to the existing literature in two ways. First, the study fills the gap of lack of studies that explore the determinants of the credit growth of the banking sector in Sri Lanka at macro level by examining the bank-specific, monetary, and macroeconomic determinants. Second, the study sheds light for future researchers to conduct individual bank-specific analysis in this regard that would help to identify micro-level determinants of banking sector credit growth.

The study used nine variables representing three categories including banks specific variables, macroeconomic variables, and monetary policy variables. Error correction version of the ARDL model was used for the data analysis. Based on the data for the aforementioned variables, the study analyzed both short-run and long-run determinants of the banking sector credit growth in Sri Lanka.

Results of empirical estimations revealed that growth of money supply, non-performing loan ratio, lending rate, and inflation rate and efficiency ratio have a strong link with credit growth compared to other bank-specific variables. Growth of GDP and credit growth tend to have a relationship that supports the 'demand following' hypothesis of finance-growth theory. However, in the short-run, all bank specific factors show marginal impact on credit growth. Error correction shows slow to medium rate adjustments in many variables. Based on the results, the study concluded that money supply growth, interest rate, inflation, GDP growth, non-performing loan, and banking efficiency are the long-term determinants of credit growth in Sri Lanka. Even though the other bank specific variables contribute marginally, a firm confirmation cannot be given for them to consider as long term determinants.

These results have several policy implications. First, since the study has found the demand following nature, which emphasized that financial performance enhances along with the level of economic growth, the government should prioritize all

growth promoting policies, because as previously mentioned in the paper, economic growth is at a very low level in Sri Lanka at present. When growth occurs, the economy expands, and therefore demand for financial services increases as well. However, to achieve the desired growth, a continuation of expansionary monetary and fiscal policies is necessary because, at the moment, the economy is in a slump. Nonetheless, to maintain sustainability, plausible demand management policies are also put forward, as theories and existing empirical evidence have shown that continuous increase in aggregate demand creates inflationary pressure which in turn brings adverse economic impacts. However, this frequent implementation of expansionary monetary and fiscal policies should be closely coordinated to avoid unnecessary demand and inflationary situations. In addition, the monetary targeting framework of the CBSL should continue since growth of money supply affects credit growth in the country. Results of this paper is, to some extent, limited as the study can further be enhanced by incorporating deposit growth into the model since the paper was compelled to exclude that variable from the estimation as it created robustness issues in the estimations.

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