THE RELATIVE IMPACT OF DOMESTIC AND EXTERNAL PUBLIC DEBT ON INVESTMENT IN SRI LANKA

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Abstract

Using the Johansen cointegration approach, this study examines the relative impact of both domestic and external debt on domestic investment in Sri Lanka from 1990 to 2019. The findings revealed that high domestic and foreign borrowing were found to be inversely associated to domestic investment, showing that both domestic and external debts are crowding out investment in Sri Lanka. In addition, the impact of domestic debts is greater than external debts. Also, debt service payment and trade openness adversely affect the volume of domestic investment, confirming the presence of crowding out effect. Further, real GDP growth rate positively influence the domestic investment in Sri Lanka, suggesting higher GDP growth rate provides further expansion in investment. Hence, this study recommends that the government should formulate better debt management strategies in order to increase the volume of investment in the country.

Keywords: Crowding-out effect, Domestic Debt, External Debt, Domestic Investment, Sri Lanka
JEL Code: H72, H68, H63

1. Introduction

Over the past decades, most of the developing countries around the world have had to deal with the macroeconomic issue of escalating debt crisis. The total outstanding government debt, which includes both internal and external debt, has reached an unprecedented level, threatening economic growth and development in most of the developing economies. In Sri Lanka, public debt has continued to rise enormously after the economic liberalization in 1977. It is one of the important sources of funding for the government's budget deficit under fiscal policy (Ranjith and Thilanka, 2018). Higher debt burden has put high pressure on the government budget as well. Interest payments on public debt consumes a large part of the government revenue and represents a large portion of government expenditure.

Sri Lankan experiences shows an excessive budget deficit and recorded an increasing trend both in nominal terms and as a share of total GDP throughout the years. In turn, budget deficit will continue to be financed through more borrowings from domestic and external markets which in turn increase the amount of public debt. There are many criticisms against government's borrowings as it can lead to a debt trap, putting the country's economic development at risk. However, borrowing money that are used properly and productively for the purpose for which they were borrowed will not always have a negative effect on the economy.

Traditional and modern economic theories state that reasonable public debts from domestic and external sources will mostly enhance the economic activities and lead to economic growth and development. However, the direction of government spending will determine whether the public debt leads to economic growth or not. For instance, government borrowings to service debt payments, for current consumption or for recurrent expenditure may not stimulate the country's economic performance, whereas borrowing to carry out long term development projects, increase capital

expenditure and rational investment in productive sectors will lead to economic growth in long term. Unfortunately, many developing countries like Sri Lanka borrow for the former reason, which is why their fiscal deficit and debt profile keeps increasing, investment keeps falling, unemployment rises, national output falls and majority of the residents are affected by poverty (Ogunjimi, 2019). The higher debt profile lowers economic growth partly by lowering investment and increasing poverty (Egbetunde, 2012).

Furthermore, government borrowings can crowd-out private investment and reduce the future output of the country. Government borrowings from domestic banking sources increase the demand for the loanable funds and may affect interest rate to rise up. At higher interest rate, the usable cost for the private credit increases and then the ability to access loanable funds for private sector may discourage. This is referred to as the crowding out effect of public debt on private investment in the domestic financial market. The crowding out effect reduces private investment and impedes the nation's economic growth and development. In case of Sri Lanka, escalating debt profile has reached such high levels throughout the years. As a result, debt servicing has become a significant problem for the Sri Lankan government. Furthermore, a large debt service payment obstructs the flow of resources toward economic development and increases the budget imbalance.

In Sri Lankan history, since 1940's the government started to adopt the deficit financing policy in which the government expenditure exceeded the government revenue. One exception can be seen for the above mentioned in the years 1954 and 1955 where government experienced little surplus budget (CBSL Report, 2010). Most serious implication of this deficit financing policy is that after 1984, Sri Lanka experienced an excessive deficit budget. Since 1994, in nominal terms, government revenue from tax and non-tax sources are not sufficient to meet the recurrent expenditure of the Sri Lankan economy which leads to an excessive budget deficit and higher debt profile. The following figure shows the trend of fiscal operations and fiscal balance in Sri Lanka from 1980 to 2019.
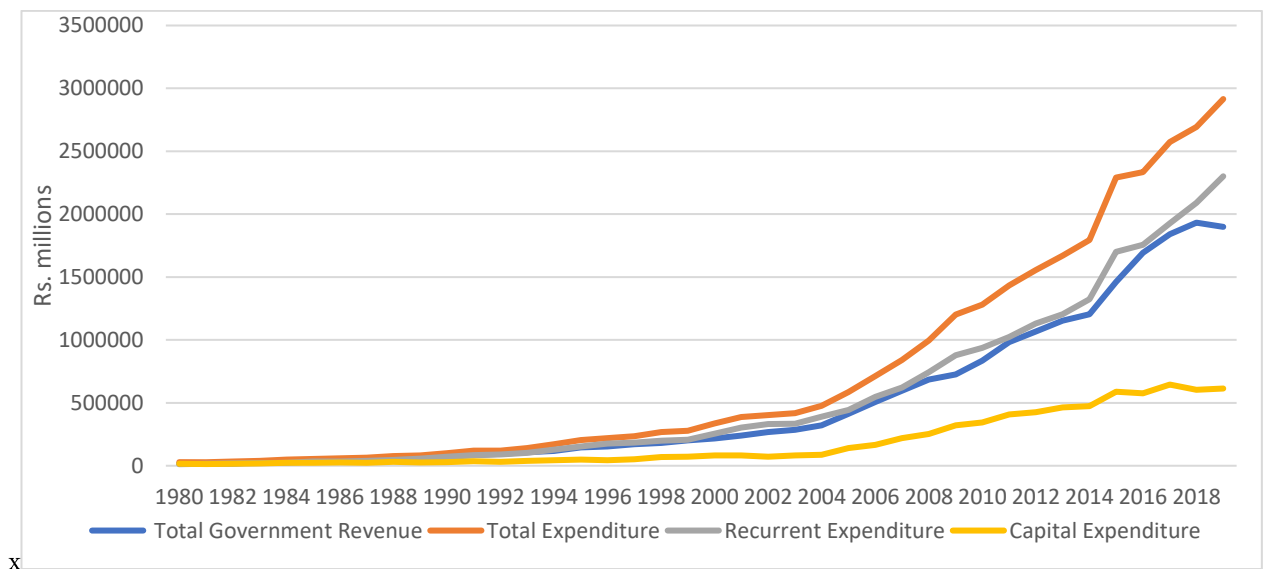

Figure 1: Trend of Government Fiscal Operations and Fiscal Balance in Sri Lanka (1980 – 2019)

Source: Computed by Author from CBSL Annual Report (2019)

Most of the developing countries endorse debt or borrowing option as a better deficit financing option as they do not cause inflationary effects in an economy compared with printing money or imposing excessive taxes on public. Printing money causes inflation through increasing the money supply and has negative consequences on the economy in the long-

term, if we use to spend them on unproductive ventures, such as to service debt payments, for current consumption or for recurrent expenditure. Moreover, increasing taxes to intolerable level or reducing the capital expenditure in order to reduce the budget deficit are major threats for the high and sustainable growth and development of the country (Fonseka and Ranasinghe, 2007). Even though these arguments advised debt as a better financing option, excessive government borrowings over the capacity of the country causes adverse impacts in an economy. In order to finance higher budget deficit, the government borrows domestic and external debts which in turn increase the indebtedness and higher debt profile. Also, the economy had to borrow additional debts to pay even the debt servicing payments for the existing debt. As a result, it may lead the country into a debt trap problem.

The excessive and unsustainable debt levels cause a negative repercussion in an economy. It will negatively impact on internal and external balance of the country. In the recent years, indebtedness has become as one of the major development policy issues for Sri Lanka economy. Sri Lanka's experience demonstrates the accumulation of massive state debt. Domestic and external debts continue to rise, both in terms of GDP and in nominal terms through the years. Following economic liberalization in 1977, the rapid increase in external debt imposed a double burden in comparison to domestic debt. As a result, there is macroeconomic instability. The following graph depicts the trend of the domestic, external and total public debts as a percentage of GDP from 1970 to 2019.
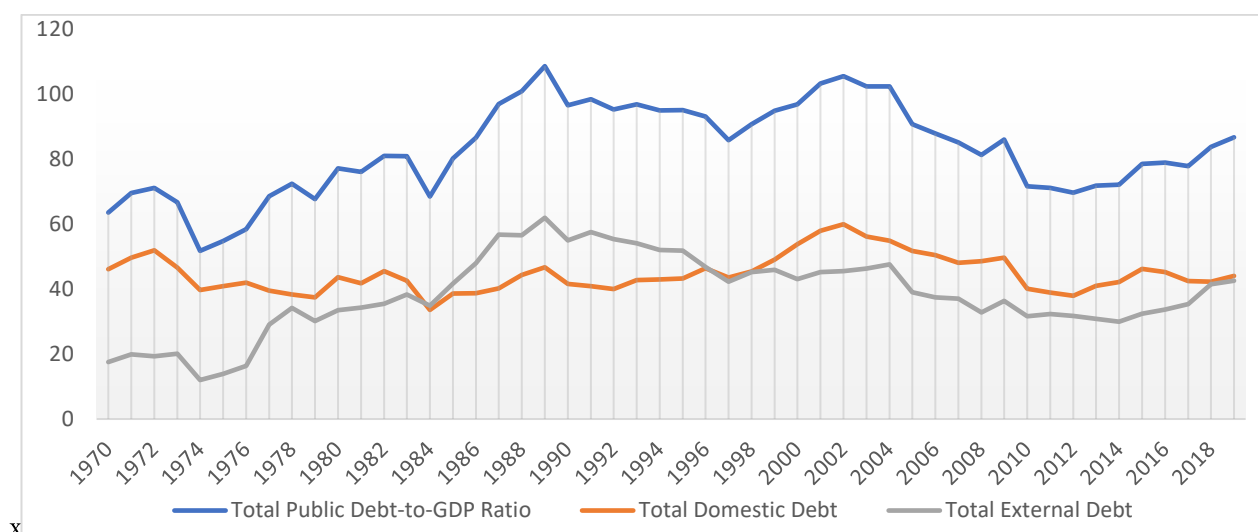

Figure 2: Public Debt profile in Sri Lanka (1970 – 2019)

Source: Computed by Author from CBSL Annual Report (2019)

Debt as a percentage of GDP is a widely used indicator of the level of public debt. During the period of 1970 to 1977 the average public debt was around 60% of GDP. After the liberalization of the economy in 1977, the total outstanding public debt increases sharply from Rs. 24,985 million in 1977 to Rs. 924,699 million in 1998 showing an annual average growth rate of 12%. The public debt to GDP ratio was 68.6% in 1977 and it had increased up to all time highest rate of 108.7% of GDP in 1989 (Central Bank Annual Report, 2019). From 2001 to 2004, the total debt to GDP ratio was remained above 100%. According to the study of Kumara and Cooray (2013), 59.42 percent of GDP is the threshold level for public debt in Sri Lanka and above this level, public debt create adverse effect on GDP per capita growth. Along with public debt, higher burden of debt payments has been a challengeable issue in Sri Lanka. According to Karagol (2002), the cost of servicing public debt can crowd out public investment expenditure (capital expenditure) by immediately decreasing total investment and indirectly reducing private investment.

In Sri Lanka, major portion of the government total expenditure was debt service payments which has increased significantly both in terms of GDP share and in nominal terms throughout the years. In 2019, The interest payment on debt was Rs. 901.4 billion, of which Rs.652.8 billion was used to service interest on domestic debt and Rs.248.6 billion was used to service interest on external debt. Furthermore, total debt service as a percentage of total revenue increased from 80.2 percent in 2017 to 107.0 percent in 2019 (Central Bank Annual Report, 2019). Thus, the rising share of debt service payment expenditure out of total recurrent expenditure limits the space available for public investment. Figure 3 depicts the trend in Sri Lanka's public debt and total investment as a share of GDP from 1970 to 2019.
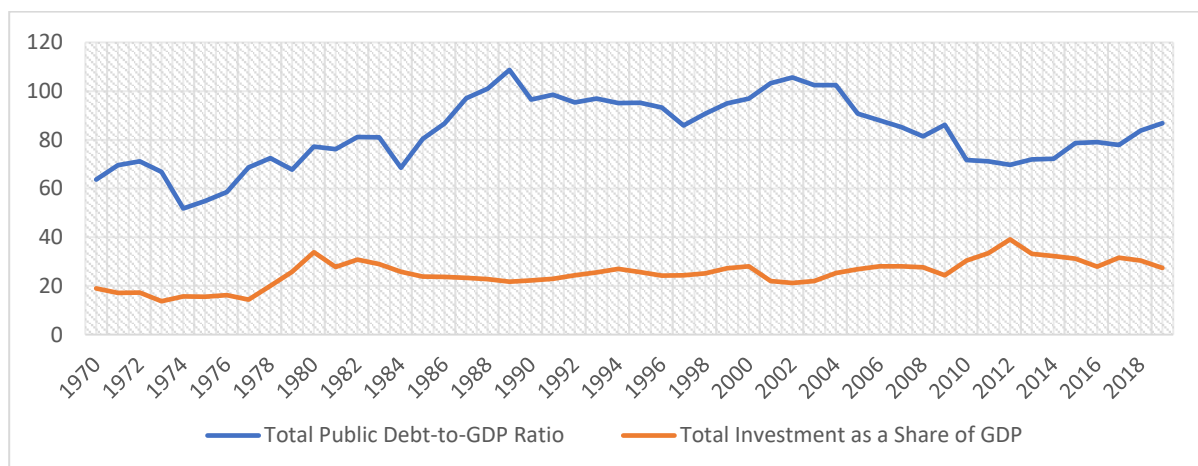

Figure 3: Trend in Sri Lanka's public debt and total investment as a share of GDP (1970-2019)

Source: Computed by Author from CBSL Annual Report (2019)

The increased debt burden payments impose a heavy strain on the countries' budgets. In order to finance budget deficit, the indebted countries increase tax and borrow more money in domestic financial sources to service the loans, and thus, affecting private and public investments. Theoretically, different school of economists have different thoughts regarding the impact of public debt on investment. According to the neoclassical perspective, a budget deficit crowds out private investment by raising interest rates. In contrast, the Ricardian Equivalence theory argued that when the government borrows money, there is no crowding out of private investment because people will reduce consumption and increase saving to cover -up the increase in future tax liabilities. Because of the multiplier effect, Keynesian economists claim that public investment through government expenditure, crowds in private investment. Conservative economists, on the other hand, argue that increased government spending cannot possibly boost overall economic activity. Although several studies have looked into the relationship between foreign public debt and investment, very few have looked into the relative impact of both domestic and external debt on investment in Sri Lanka (Akram, 2017; Wijeweera et al. 2005; Thilanka and Ranjith, 2017). Hence, this study pervades the gap in the literature the relative impact of both domestic and external debt on domestic investment in Sri Lanka from 1990 to 2019. However, they did not give clear policy directions regarding the relationship between public debt and investment. In this view point, this study aims to identify the impact of both domestic and external debt on investment in Sri Lanka.

2. Literature review

In the empirical literatures, there have been varying opinions on the impact of public debt on investment. While some argue for the crowding-out effect, others argue for the crowding-in effect. For instance, Ogunjimi (2019) conducted a study to investigate the impact of public debt on the various forms of investment in Nigeria both in the short-run and long-run for the period between 1981 and 2016. This study disaggregated public debt into domestic and external debt

and tries to investigate the impact of public debt on various forms of investment such as, public investment, Private investment and Foreign Direct Investment (FDI). Autoregressive Distributed Lag (ARDL) Bounds test cointegration method is employed to identify the existence of a long-run relationship among the variables. The results showed that domestic debt crowds-in both private and public investment in the short-run and long-run but it does not significantly influence FDI both in the short-run and long-run. On the other hand, External debt crowds-in private investment but crowds-out public investment both in the short-run and long-run and it does not significantly influence FDI. The empirical results also concluded that the impact of external debts on various types of investment in Nigeria is greater than domestic debts.

In the same vein, Kingwara, (2014) examined the impact of domestic public debt on private investment levels in Kenya over the period of 1967-2007. Johansen cointegration method was employed to detect the existence of long-run cointegrating relationship among the variables private investment, real GDP growth rate, real interest rate, domestic debt and investment. The findings revealed that higher level of domestic public debt has had a crowding out effect on private investment in Kenya.

Using Autoregressive Distributed Lag Model, Mutunga (2020) investigated the impact of public debt on private investment in Kenya between 1980 and 2019. The study found that domestic debt has a negative impact on Kenyan private investment in the short run, but has a positive impact in the long run. In contrast, external borrowing crowds out private investment in the long run while in short-run, it crowds in private investment in Kenya. In addition, the study found that Kenya's debt service has a negative effect on private investment in both the short and long run, implying that higher debt servicing lowers private investment in Kenya.

Kamundia et al. (2015) used the Ordinary least squares estimation method to conduct a study in Kenya to determine the effects of public debt on the level of private investment and economic growth in Kenya from 1980 to 2013. In addition, Granger causality test was carried out to determine the direction of causality between public debt and private investments and it was found that the presence of unidirectional causality from debt to private investments. Moreover, this study confirmed that Kenya's public debt has negative and significant impact on private investment, implying higher public debt stock leads to a reduction in the level of private investment in Kenya. On the other hand, positive relationship was found in between public debt and economic growth. According to this study, investments must be above 32 percent of GDP with private investments being above 24 percent, in order to achieve 10 percent per annum growth rate.

Lidiema (2018) also studied the impact of government domestic borrowing on private investment using Gross fixed capital formation as a dependent variable while Domestic debt, financial development, gross domestic savings, real interest rate and GDP per capita as explanatory variables. The study employed the time series annual data from 1975 to 2014. The Auto Regressive Distributed Lag (ARDL) technique was used to determine the variables' long-run and short-run co-integration relationships. According to the ARDL results, there is a significant negative relationship between domestic debt and gross fixed domestic capital formation in the short run, implying that an increase in domestic debt crowds out gross fixed capital formation in Kenya. However, in the long run, there is an insignificant negative long run relationship between Domestic debt and gross fixed domestic capital formation. On the other hand, the impact of External Debt on investment is positive and insignificant in the long run but negative and significant in the short run.

Similarly, Ozdemir and Gomez (2020) aims to analyze the impact of domestic debt on private investment for the case of Gambia from 1980 to 2013, using Autoregressive Distributed Lag (ARDL) bound test to cointegration method. The results show that domestic debt has a significant negative impact on private investment only in the short run, confirming the crowding out effect of public debt on private investment. However, in the long run, Domestic debt has positive but insignificant impact on private investment in Gambia.

In contrast, Apere (2014) investigated the effect of domestic and external debt on private investment in Nigeria from 1981 to 2012. This study employed the instrumental variable technique of estimation and bootstrapping technique for

the computation of normal based standard errors for the debt turning points (nonlinear relationships). The major findings of this study show that the impact of domestic debt on private investment in Nigeria is linear and positive, implying the crowding in effect of domestic debt on private investment. However, the impact of external debt on private investment in Nigeria is nonlinear and U-shaped. This means that the relationship between external debt and private investment in Nigeria is negative until a certain point and then becomes positive.

Akomolafe et al. (2015) examined the impact of public debt on gross domestic investment in Nigeria between 1980 and 2010, using Johansen Co-integration technique and Vector Error Correction Model (VECM). The study disaggregated public debt into domestic and external debt. The results indicate that domestic debt is negatively related to domestic investment in both the short and long run, implying that domestic debt crowds out investment. However, the findings show that external debt attracts domestic investment in the long run while crowding it out in the short run. Furthermore, in the short run, there is a positive relationship between GDP growth rate and domestic investment, but an inverse relationship in the long run.

Majumder (2007) conducted a study to examine the presence of crowding-out effect of public borrowing on the private investment in the Bangladesh economy. To achieve this objective, a model for investment function has been specified and estimated including public borrowing, GDP and interest rate as independent variables. The main findings of the study confirm with statistical significance that there is no crowding-out effect in Bangladesh. The results show that public debt has a positive impact on private investment, implying the crowding in effect of public debt on private investment in the Bangladesh economy.

Mabula and Mutasa (2019) investigate the impact of public debt on private investment in Tanzania from 1970 to 2016, using domestic debt, external debt, debt service and private consumption expenditure as explanatory variables. An Autoregressive Distributed Lag (ARDL) bound test to cointegration is used in this study and these results provide strong evidence that external debt plays a role as an indicator in determining the long run behavior of private investment while domestic debt and debt service were found to be statistically insignificant. Furthermore, this study concluded that the impact of external debt in Tanzania is both linear and nonlinear inverted U-shape, contributing positively on private investment until reaching a threshold of 40.89 percent, at which point private investment begins to decline as external debt becomes a burden and contributes negatively.

In the case of Sri Lanka, there are very limited number of studies conducted to analyse the effects of public debt on investment of Sri Lanka. Within the Sri Lankan context, Akram (2017) examined the consequences of public debt for economic growth and investment, for the period 1975-2014 by using the Autoregressive Distributed lag Model (ARDL) technique. In order to identify the impact of public debt on economic growth and investment, the debt is disaggregated into external and domestic debt. According to the study, external debt has a positive and significant relationship with per capita GDP and investment in Sri Lanka, both in the short and long run. Debt servicing, on the other hand, has a negative and significant relationship with per capita GDP and investment, confirming the existence of a crowding out effect in Sri Lanka. However, a study conducted by Wijeweera et al. (2005) using cointegration and vector error correction method for the period 1952 to 2002, found no evidence of debt overhang problem in Sri Lanka. Moreover, this study did not establish a significant short run and long run relationship between external debt service and GDP.

Further, Thilanka and Ranjith (2017) aimed to identify the crowd in/crowding out effect of public debt on private investment through both domestic and foreign debt in Sri Lanka from 1988 to 2015. The findings of this study revealed that both domestic and external public borrowings crowd out private investment in the long-run. According to the long-run estimation results, when domestic debt and external debt increases by 1 % of GDP, private investment decreases by 0.261% and 0.255% of GDP respectively in the long-run.

In contrast, Thilanka and Ranjith (2018) conducted an empirical study to re-examine the impact of public debt on private investment in Sri Lanka using annual data from 1978 to 2015. The findings provide evidence for the crowding-in effect of public debt on private investment in the long run. Furthermore, real GDP has a positive impact on private investment in Sri Lanka.

Hence, it is apparent that the effect of public debt on investment of a country is still ambiguous. They have either concentrated on the impact of domestic debt or external debt on private investment. In some empirical studies the whole component of the public debt was not used to investigate which in turn does not produce the clear relationship between public debt and private investment. In our current study, in order to identify the impact of public debt on domestic investment, the debt is disaggregated into external and domestic debt. Moreover, under the Sri Lankan context smaller number of studies try to identify the casual relationship between public debt and investment. However, they do not support clear policy direction regarding the relationship between these two variables. In order to fill this research gap, this study aims to identify the crowding in or crowding out effect of public debt on investment for the case of Sri Lanka.

3. Methodology

3.1 research data and sources

Using annual time series data from 1990 to 2019, this study examined the impact of public debt (domestic and external debt) on the volume of investment in Sri Lanka. The data used in this study were obtained from the Central Bank of Sri Lanka's annual reports and World Bank Development Indicators.

3.2 Model specification

Based on the crowding out hypothesis' theoretical framework, this study modified the model used by Thilanka and Sri Ranjith (2018) and Mutunga (2020) on the relationship between public debt and private investment to address this research problem in the Sri Lankan context, adding Debt Service Payments and Trade Openness as new variables. The Dependent variable Gross Domestic Investment includes both private and public investment in Sri Lanka. The majority of empirical studies focus only on the impact of public debt on private investment. In order to fill that research gap, this study includes both public and private investment to find out the overall impact on investment of Sri Lanka which is related to the model of Akomolafe et al. 2015. In order to identify the impact of public debt on domestic investment, the debt is disaggregated into external and domestic debt. The empirical reason for categorizing public debt as domestic and external debt is to compare the relative impact of both components of public debt on investment in Sri Lanka (Thilanka and Ranjith, 2017; Ogunjimi, 2019; Akomolafe et al. 2015). The investment model is represented as follows:

$$GDI = f(EXD, DD, GDP, DSP, TOP) \qquad (1)$$

The regression form of the model is represented below,

$$LGDI_t = \beta_0 + \beta_1 LEXD_t + \beta_2 LDD_t + \beta_3 LGDP_t + \beta_4 LDSP_t + \beta_5 TOP_t + \varepsilon_t \qquad (2)$$

Where GDI is the Gross Domestic Investment as a percentage of GDP, EXD is the External Debt as percentage of GDP, DD is the Domestic Debt as a percentage of GDP, GDP is the Gross Domestic Product growth rate, DSP is Debt Service Payment as a percentage of earnings from Exports of goods and services, TOP is Trade Openness as a percentage of GDP, ε is the error term and t is the time period (1990-2019). All the variables are converted into natural logarithm which is denoted by L in the above function.

In the above equation, based on the existing empirical and theoretical literature, we have expected that the coefficient of GDP (β_3) is expected to be positive; coefficient of debt service payment as a share of total GDP (β_4) and trade openness

(β_5) are expected to be negative and the coefficient of both external debt and domestic debt variables are expected to be either positive or negative (β_1, $\beta_2 > 0$ or β_1, $\beta_2 < 0$).

Most time series variables have unit roots because they are not stationary or their variances increase over time. If a variable is non-stationary and has a unit root, there is a spuriousness problem if the regression is estimated using ordinary least squares (OLS). Therefore, before estimating the long-run co-integrating relationship between the variables, it is necessary to check the stationary properties of the time series variables. The unit root test is the formal method to test the stationary of a time series data. In this study, the unit root test is performed by using the Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) Unit root tests.

Following the preliminary unit root analyses, a cointegration test should be used to ensure that a group of non-stationary series are co-integrated and that a long-run relationship exists. Number of researchers has employed Johansen Co-integration technique and Vector Error Correction Model (VECM) in order to find out the short-run and long-run crowding in/out effect related to public debt and the volume of investment (Thilanka & Sri Ranjith, 2018; Akomolafe et al. 2015; Kingwara, 2014; Majumder, 2007). Based on the empirical studies, Johansson Co-integration and Vector Error Correction Model were employed in this study to investigate the crowding out/crowding in effect. A long run relationship can exist in the Johansson cointegration method when series integrate in the same order.

The error correction model was used to determine the short run dynamic relationship between the variables as well as the long run equilibrium adjustment of the model, which is shown below.

$$\Delta logY_t = \alpha_0 + \prod ECT_{t-1}. + \sum_{i=1}^{p-1} \emptyset_i^* \Delta logY_{t-i} + \varepsilon_t \qquad (3)$$

Where, $\Pi = \alpha\beta'$; where α is the vector of speed of adjustment coefficient, β': (1×6) vector of co integrating coefficients, $Yt = [GDIt, EXDt, DDt, GDPt, DSPt, TOPt]$' vector of dependent variables, Y_{t-i}: lagged value of variables Yt and ε_t: white noise error term.

4. Results and discussion

4.1 unit root test results

To determine the order of integration of the relevant variables, the Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) unit root tests were carried out in this study and they conform that all the variables are stationary at their first difference (I[1]). The results of the ADF and PP unit root tests are shown in Table 1.

Table 1: Unit Root test results

Variable	Augmented Dickey-Fuller test						Phillips-Perron test						Order of Integration
	At level			First Difference			At level			First Difference			
	Constant	Constant and Trend		Constant	Constant	and Trend	Constant	Constant	and Trend	Constant	Constant	and Trend	
LGDI	-2.178	-2.440		-4.862***	-4.816***		-2.160	-2.274		-6.722***	-7.218***		I(1)
LEXD	-1.553	-0.573		-5.536***	-6.132***		-1.580	-0.719		-5.544***	-6.062***		I(1)

LDD	-1.503	-1.940	-4.239***	-4.248**	-1.629	-1.551	-4.255***	-4.254**	I(1)
LGDP	-0.335	-1.741	-3.922***	-3.837**	-0.325	-1.684	-3.922***	-3.837**	I(1)
LDSP	-3.837	-2.292	-6.003***	-6.210***	-1.333	-2.135	-6.347***	-14.430***	I(1)
LTOP	-0.668	-2.244	-4.626***	-4.638***	-0.743	-2.279	-4.635***	-4.648***	I(1)

Note: t-statistic are given in table

'***', '**' and '*' represent 1%, 5% and 10% level of significance of the p-values respectively

Source: Author's computation using EViews10

According to the results of the ADF and PP unit root tests, all variables in the model are not stationary at level, but they become stationary after taking first difference, which ensures that all the variables are integrated in order [1(1)]. After determining the order of variable integration, the optimal lag length of the model must be determined. The optimal lag length selection results are shown in Table 2.

Table 2: Optimal lag length selection results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	109.5044	NA	2.48e-11	-7.393169	-7.107697	-7.305897
1	287.1930	266.5329*	1.06e-15*	-17.51378	-15.51548*	-16.90288*
2	323.3062	38.69279	1.57e-15	-17.52187*	-13.81073	-16.38734

* Indicates lag order selected by the criterion

Source: Author's computation using EViews10

Accordingly, the LR, FPE, SC, and HQ criteria all suggest that the optimum lag length is one, whereas the AIC criterion suggests two lag lengths. According to the results, the majority of the criteria suggest that lag length one be used as the optimum lag length for this analysis.

4.2 Johansen co-integration test results

The results of the Johansen Co-integration test are given below in the following table 3 and 4. According to the results, both the Trace test statistic and the Maximum Eigenvalue identified two co-integrating relationships in the system equation at the 5% level of significance, indicating the existence of a long-run relationship between the variables in the study. This is important for the estimation of VECM.

Table 3: Result of Johansen Unrestricted Co-integration Rank Test (Trace test)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.824979	123.4184	95.75366	0.0002
At most 1 *	0.732039	74.61859	69.81889	0.0197
At most 2	0.396716	37.74501	47.85613	0.3132
At most 3	0.347956	23.59473	29.79707	0.2181
At most 4	0.290432	11.62071	15.49471	0.1761
At most 5	0.069401	2.013940	3.841466	0.1559

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level   **MacKinnon-Haug-Michelis (1999) p-values
Author's computation using EViews10

Table 4: Result of Johansen Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.824979	48.79983	40.07757	0.0041
At most 1 *	0.732039	36.87358	33.87687	0.0213
At most 2	0.396716	14.15028	27.58434	0.8121
At most 3	0.347956	11.97402	21.13162	0.5502
At most 4	0.290432	9.606772	14.26460	0.2391
At most 5	0.069401	2.013940	3.841466	0.1559

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level   **MacKinnon-Haug-Michelis (1999) p-values
Author's computation using EViews10

4.3 Results of the vector error correction model (vecm)

Once we identifying the existence of cointegration relationship, the long-run equilibrium adjustment and long-run and short-run dynamic relationship between the variables are examined using VECM. In this study, VECM is estimated using two cointegration relationships, and the long-run relationship between the variables is shown below.

$$LGDI = -5.95 - 0.256\ LEXD - 0.622LDD + 0.127LGDP - 0.335\ LDSP - 0.354LTOP \qquad (4)$$
$$ (2.87317) \quad (8.37784) \quad (-2.91603) \quad (7.69540) \quad (3.50746)$$

Note: t- statistics are given in parentheses.

Accordingly, both domestic and external debt have significant negative impact on the gross domestic investment in Sri Lanka at 1% significant level, implying that higher government borrowing lowers the volume of investment of our country. The long run coefficient of the Domestic Debt (DD) and External Debt (EXD) depict, when domestic debt increases by 1% of GDP, Gross Domestic investment decreased by 0.622% of GDP and when external debt increases by 1% of GDP, Gross Domestic Investment decreases by 0.256% of GDP. According to the study objective, it is clear that both domestic and external debts crowd-out the volume of investment of Sri Lanka in the long-run. This is consistent with the findings of Kamundia et al. 2015; Akomolafe et al. 2015; Olweny & Chiluwe, 2012; Lau et al. ,2019; Abdullahi et al. 2016. The long-run results also revealed that domestic debt has a greater impact on domestic investment in Sri Lanka than external debt.

The study also found that Sri Lanka's debt service payment has a negative effect on investment in the long run, confirming higher debt service payments lowers the public (Government Capital Expenditure) and private investment in Sri Lanka. The negative long run coefficient of the Debt Service payment ratio (DSP) implies, when variable DSP increases by 1% of GDP, Gross Domestic Investment Decreases by 0.335 % of GDP in the long run. Moreover, the real GDP growth rate shows a positive relationship with the growth of the Domestic Investment in Sri Lanka in the long run. The estimated long-run coefficient of variable GDP implies when real GDP growth rate increases by 1%, the Gross Domestic Investment

increases by 0.127 % of GDP in the long run, implying high and sustainable economic growth stimulates the volume of investment of a country.

Furthermore, the findings revealed that trade openness adversely affects the gross domestic investment in Sri Lanka in long-run, as expected. According to the long-run estimation results of variable TOP, if trade openness as percentage of GDP increases by one percent, Gross Domestic Investment as percentage of GDP decreases by 0.354%, implying that trade liberalization lowers the domestic investment in long run. This is consistent with the findings of Kim et al. 2013. According to that study, trade is harmful to domestic investment of countries with low income generated, low human capital, less financially developed system, or high corruption. Likewise, in a less financially developed and low income generated developing country like Sri Lanka, trade is unfavorable for the growth of Domestic Investment in long-term.

Table 5: ECM results of the Speed of Equilibrium Adjustment

Error Correction Coefficient	D(LGDI)	D(LDD)	D(LEXD)	D(LDSP)	D(LGDP)	D(LTOP)
ECT (-1)	**-0.26031*****	0.342396	-0.094421	-0.444329	-0.25159***	0.217629
Standard Errors	(0.27748)	(0.24381)	(0.36246)	(0.97393)	(0.06383)	(0.32277)
t- statistics	[-3.69863]	[1.40437]	[-0.26050]	[-0.45622]	[-3.94148]	[0.67425]

Note: '***', '**' and '*' represent 1%, 5% and 10% level of significance respectively
Source: Author's calculation using EViews10

Table 5 shows the results of long run adjustment coefficient of the Error Correction Model (ECM). The speed of adjustment coefficient (Error Correction Term) represents how the above model is adjusted towards long run equilibrium following external shocks. According to the results in table 4, the Error Correction Term (ECT) of Gross Domestic Investment has an expected negative sign and is highly significant at the 1% level, indicating that the dependent variable Gross Domestic Investment can return to the long run equilibrium path at speed of 26.03 percent each year after exogenous shocks. This is further evidence of co-integration relationships among the variables in the model.

Table 6: Short run testing of the Vector Error Correction Model (Short run relationship)

Variables	D(LGDI(-1))	D(LDD(-1))	D(LEXD(-1))	D(LDSP(-1))	D(LGDP(-1))	D(LTOP(-1))
	0.261972	0.544982	0.439022**	-0.043122	-0.068995	-0.010335
	(0.24709)	(0.35720)	(0.21068)	(0.10683)	(1.20457)	(0.25863)
D(LGDI)	[1.06021]	[1.52571]	[2.08380]	[-0.4036]	[-0.05728]	[-0.03996]

Note: '***', '**' and '*' represent 1%, 5% and 10% level of significance respectively
Standard errors in ( ) & t-statistics in [ ]
Source: Author's calculation using EViews10

Table 6 depicts the short run relationship between the variables. Last year's GDI has the positive impact on the current GDI, meaning that when other factors being constant, 1% increase in the last year GDI would translate to a 0.261972% increase in current year GDI, but the impact is not statistically significant. Furthermore, the short run results show that there is no short-run relationship between variables at any level of significance (between 1990-2019), implying that there are no instant responses of the domestic investment to the variation of any kind of variables in the model, except the

variable EXD. The short run results of variable EXD show that external debt has a significant positive impact on gross domestic investment at a 5% level of significance, confirming the presence of crowding in effect of external debt on the growth of gross domestic investment in Sri Lanka in the short run. This is consistent with the findings of Mutunga, 2020 and Ogunjimi, 2019.

The crowding-in effect of external debt in short-run implies that external debt is used to fund a large number of infrastructure development projects in Sri Lanka due to a lack of its own financial resources, and it has contributed enormously to meeting the operational needs of large-scale development projects, which in turn stimulates the volume of investment in the short run. In contrast, the increased demand for the external debt over the capacity of the country causes adverse impact in long-run. Domestic debt, on the other hand, crowds out domestic investment in the short run, but the impact is not statistically significant at any level of significance. (see the appendix 1.1).

Furthermore, the Johansen cointegration and Vector Error Correction (VEC) model passes the diagnostic tests of VEC Residual Normality tests, VEC Residual Serial Correlation LM tests and VEC Residual Heteroskedasticity test. Moreover, the Auto Regressive root graph in appendix 1.3 reveals that all the variables are lies inside the circle with one variable lies at the border of the circle. As a result, the estimated Vector Error Correction model is more stable in explaining the short-run impact of both domestic and external debt on domestic investment.

In addition, Granger causality test was carried out to determine the direction of causality between public debt and gross domestic investments and it was found that the presence of unidirectional causality stemming from domestic debt (DD) to gross domestic investment (DIV) and external debt (EXD) to gross domestic investment at 5% level of significance. This study further found a unidirectional causality from EXD to DSP, GDP to DSP and DIV to DSP and bidirectional causality between TOP & GDI and TOP & GDP.

4.4 Results of variance decomposition

Variance Decomposition analysis determines the relative importance of shocks in explaining variations in the variable of interest. It demonstrates a way of determining the relative importance of shocks to each of the debt variables in explaining variations in domestic investment in the context of this study. The results of the variance decomposition analysis on domestic investment are presented in Appendix 1.2. Accordingly, domestic investment responds mostly to its own variation in the first two periods. Then, domestic debt began to respond mostly to variations in domestic investment, and it has had the greatest influence on the growth of domestic investment, with an average of 42 percent throughout the last periods. Though debt service payments responded highly in explaining variations in domestic investment alongside the own variation in GDI in the first two periods, it began to decline slightly and showed an average of 18 percent during the final period. Furthermore, the findings revealed that domestic debt has a greater impact on domestic investment than external debt.

5. Conclusion and policy implication

This study aims to examine the crowding-out or crowding-in effect of public debt on domestic investment in Sri Lanka. This study employed a model for investment function was specified and estimated using domestic and external public debt, real GDP growth rate, debt service payments, and trade openness as independent variables. The ADF and PP unit root tests results confirmed that all the variables were stationary after first difference. As per the lag length criteria, the study uses lag length one as optimal lag length. Further, the Johansen cointegration test results verified the long-run cointegrating relationship between the variables. The findings reveal that both domestic and external debts have a significant negative impact on domestic investment in the long run, confirming that the existence of a crowding-out effect of public debt on domestic investment in Sri Lanka. Furthermore, the short-run results show that, expect for external

debt, none of the independent variables has a significant impact on Gross Domestic Investment. Though, external debt crowds out domestic investment in the long run, it crowds-in in the short run, implying that external borrowing stimulates domestic investment in the short run. In contrast, the increased demand for the external debt over the capacity of the country causes adverse impact on investment in long-run

Furthermore, debt service payment also crowds out domestic investment in Sri Lanka through having significant an adverse impact on the growth of domestic investment in the long run. In addition, real GDP growth rate has a significant positive effect on investment in long run, implying that higher GDP growth rate provides further expansion in domestic investment. The results further revealed that trade openness adversely affects gross domestic investment in Sri Lanka. Based on this empirical finding, the study concludes that total investment in Sri Lanka is being crowded out by both domestic and external debt stocks. Moreover, the impact of domestic debts on domestic investment is greater than external debts in Sri Lanka. Under the theoretical perspective, these results can be justified using the relevance of crowding-out theory of neoclassical view in explaining the relationship between public debt and private investment in Sri Lanka.

Based on these empirical findings, this study recommends that policymakers formulate and implement appropriate policies to ensure that public debts are effectively and efficiently used for the purpose for which they were borrowed, as well as make fruitful efforts toward effective debt management in order to increase the volume of investment in the country and achieve the desired level of economic growth. For instance, Government borrowing to carry out long term development activities, increase capital expenditure and rational investment in productive ventures will lead to economic growth in the long term. Based on that, utilizing public debt in massive infrastructure development projects such as road networks, highways, telecommunication and electricity projects will pave the way for motivation and expansion in private investment.

Further, the government should make maximum effort to manage public debt appropriately in order to reduce the pressure on interest rates. Also, measures should be implemented to increase revenue through appropriate tax policy reforms and the use of non-bank borrowings in the long-run. Moreover, the risks inherent in the government's debt structure should be carefully monitored and evaluated in order to mitigate the risk in the government debt structure. Furthermore, the government should avoid utilizing massive quantities of public debt to make debt obligations in order to reduce volatility in debt service costs and ensure a balanced distribution.

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Appendices

1.1 Short-run relationship using vecm

Error Correction:	D(LNDOINV)	D(LNDODEB)	D(LNFODEB)	D(LNDSER)	D(LNGDP)	D(LNOPEN)
CointEq1	-0.260313	0.342396	-0.094421	-0.444329	-0.251593	0.217629
	(0.27748)	(0.24381)	(0.36246)	(0.97393)	(0.06383)	(0.32277)
	[-3.69863]	[1.40437]	[-0.26050]	[-0.45622]	[-3.94148]	[0.67425]
D(LNDOINV(-1))	0.261972	-0.011046	-0.027527	-0.137244	0.123111	0.290679
	(0.24709)	(0.21710)	(0.32276)	(0.86726)	(0.05684)	(0.28742)
	[1.06021]	[-0.05088]	[-0.08529]	[-0.15825]	[2.16588]	[1.01133]
D(LNDODEB(-1))	0.544982	-0.172164	-0.243353	0.590600	0.172357	-0.314433
	(0.35720)	(0.31385)	(0.46658)	(1.25371)	(0.08217)	(0.41550)
	[1.52571]	[-0.54856]	[-0.52156]	[0.47108]	[2.09758]	[-0.75676]
D(LNFODEB(-1))	0.439022	-0.241973	-0.195276	-0.157454	-0.031719	0.234381
	(0.21068)	(0.18511)	(0.27520)	(0.73947)	(0.04847)	(0.24507)
	[2.08380]	[-1.30716]	[-0.70958]	[-0.21293]	[-0.65448]	[0.95638]
D(LNDSER(-1))	-0.043122	0.007956	0.065936	-0.092726	0.031633	-0.154170
	(0.10683)	(0.09387)	(0.13955)	(0.37496)	(0.02458)	(0.12427)
	[-0.40364]	[0.08476]	[0.47250]	[-0.24730]	[1.28719]	[-1.24062]
D(LNGDP(-1))	-0.068995	-0.598910	-1.251004	4.187185	-0.210326	-0.941507
	(1.20457)	(1.05837)	(1.57345)	(4.22786)	(0.27710)	(1.40117)
	[-0.05728]	[-0.56588]	[-0.79507]	[0.99038]	[-0.75903]	[-0.67194]
D(LNOPEN(-1))	-0.010335	0.340889	0.381909	0.240208	0.024113	-0.186891
	(0.25863)	(0.22724)	(0.33783)	(0.90774)	(0.05949)	(0.30084)
	[-0.03996]	[1.50014]	[1.13049]	[0.26462]	[0.40531]	[-0.62123]
C	0.011718	0.033804	0.053534	-0.192523	0.058565	0.039020
	(0.05970)	(0.05245)	(0.07798)	(0.20953)	(0.01373)	(0.06944)
	[0.19629]	[0.64449]	[0.68652]	[-0.91884]	[4.26468]	[0.56191]

1.2 Results of variance decomposition analyses:

The results show that domestic debt has greater influence on domestic investment than external debt does.

Variance Decomposition of

LNDOINV:

Period	S.E.	LNDOINV	LNDODE B	LNFODEB	LNDSER	LNOPEN	LNGDP
1	0.064764	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.108799	53.45815	11.20808	0.084250	31.27384	3.973485	0.002195
3	0.148048	32.51381	29.63352	1.568239	28.72060	7.020249	0.543584
4	0.174047	24.78157	37.61299	2.851078	24.13704	10.21002	0.407314
5	0.191132	21.44000	39.11097	5.310410	22.30050	11.48610	0.352022
6	0.210141	19.29997	40.24155	7.365507	20.95931	11.82428	0.309381
7	0.228274	17.43057	41.14087	8.657780	20.05519	12.44103	0.274558
8	0.245217	15.92067	41.92868	9.765754	19.30662	12.83072	0.247552
9	0.261040	14.79267	42.52666	10.68077	18.61928	13.15014	0.230478
10	0.275793	13.91047	42.91667	11.43571	18.11076	13.40761	0.218778

1.3 Auto regressive (ar) roots graph

Inverse Roots of AR Characteristic Polynomial