



# Journal of Economics and Business

---

**Cooray, Nawalage L.A. (2019), Crowding-out Effect of Public Borrowing in Sri Lanka. In: *Journal of Economics and Business*, Vol.2, No.3, 827-842.**

ISSN 2615-3726

DOI: 10.31014/aior.1992.02.03.130

The online version of this article can be found at:  
<https://www.asianinstituteofresearch.org/>

---

Published by:  
The Asian Institute of Research

The *Journal of Economics and Business* is an Open Access publication. It may be read, copied, and distributed free of charge according to the conditions of the Creative Commons Attribution 4.0 International license.

The Asian Institute of Research *Journal of Economics and Business* is a peer-reviewed International Journal. The journal covers scholarly articles in the fields of Economics and Business, which includes, but not limited to, Business Economics (Micro and Macro), Finance, Management, Marketing, Business Law, Entrepreneurship, Behavioral and Health Economics, Government Taxation and Regulations, Financial Markets, International Economics, Investment, and Economic Development. As the journal is Open Access, it ensures high visibility and the increase of citations for all research articles published. The *Journal of Economics and Business* aims to facilitate scholarly work on recent theoretical and practical aspects of Economics and Business.



ASIAN INSTITUTE OF RESEARCH  
Connecting Scholars Worldwide



# Crowding-out Effect of Public Borrowing in Sri Lanka

Nawalage L.A.Coaray<sup>1</sup>

<sup>1</sup> School of Economics, Nagoya University, Nagoya. Tel: 080-6989-2016. E-mail:lcoaray@iuj.ac.jp

## Abstract

The government of Sri Lanka has been disproportionately borrowing from the domestic banking and non-banking sectors to finance its budget deficit. These sectors also serve as funding sources for the country's private investors. The government's expansionary fiscal policy has increased its total income, but it may also raise interest rates and reduce private investment. This study estimates the crowding-out effect of public borrowing from domestic sources on private investment in Sri Lanka. Using time-series data from 1960-2014 sourced from the Central Bank of Sri Lanka and World Development Indicators, we develop an investment function with three independent variables, public borrowing, interest rate, and gross domestic product. Unit root tests and the autoregressive distributed lag and vector error correction models are also utilized. To test the long-run relationships among the variables, we conduct a bound test of co-integration, and the results show that there is long-run co-integration between the variables. Vector autoregressive models, variance decomposition analysis, the Granger causality test, and impulse response functions are used to analyse the results. The study provides evidence for the absence of a crowding-out effect in Sri Lanka as a result of public borrowing from domestic sources. This evidence has important implications of fiscal management in Sri Lanka. To avoid external indebtedness and unnecessary inflation due to debt financing, the government can rely on domestic sources without hurting private investment in the country.

**Keywords:** Crowding In Effect, Crowding Out Effect, Private Investment, Public Borrowing

## 1. Introduction

Sri Lanka has maintained huge budget deficits over the last thirty years, which has created high levels of debt. During that period, the Sri Lankan government's budget deficits have been about 7.5 percent of the country's GDP, and the debt level has reached about 90 percent of GDP (Central Bank of Sri Lanka, 2017). The Sri Lankan revenue mobilization has remained lower than the government's total expenditures; revenues have not been enough even to cover recurrent expenses. This situation has created high budget deficits over the past years and forced the government to rely on debt to finance its recurrent expenditures, which in turn has led the government to accumulate a huge debt stock (Central Bank of Sri Lanka, 2017, p. 192). Large budget deficits and high debt levels may have created a crowding-out effect on the economy as well as macroeconomic instability in the country. Researchers have presented different views about the relationship between public and private investment. Some researchers have shown that public borrowing from domestic sources (internal sources) crowds out private investment in the country. They argue that, *ceteris paribus*, large-scale public borrowing results in higher prices for the private sector, which is sensitive to interest rates. This leads to reduced investment due to lower rates of return; that is, the private sector is crowded out. Other researchers, however, have demonstrated that public borrowing produces a crowding-in effect on private investment. The crowding-in effect also originates from government deficit spending. However, such an effect is highly dependent on whether the spending increases

economic activity. An increase in economic activity that creates more opportunities for businesses and increases the profitability of business operations. Therefore, the private sector crowd-in effect can lead to improvements in consumer needs satisfaction. For example, government investment in infrastructure facilities like highways, roads, and power plants, as well as spending on education and health care may create a complementary impact on private investment by raising marginal productivity.

Many researchers, however, assert that loose fiscal policy crowds out private investment. Chhibber and van Wijnbergen (1988), Akkina and Celebi (2002), and Temin and Voth (2005) find evidence of a crowding-out effect which leads to reduced private investment. Conversely, Ramirez (1994), Hyder (2001), Naqvi (2002), Ouattara (2004), Chakraborty (2006), and Majumder (2007) conclude that public investment has a positive impact on the expectations of investors, thereby creating a crowding-in effect. This type of government spending will help to develop infrastructure, which encourages private investment in the country. Aschauer (1989) revealed that public investment in the United States has a significant, positive impact on private investment, especially when the public investment goes to infrastructure facilities that increase productivity. This reciprocal relationship between public and private investment is further proven by Greene and Villanueva (1991) and Blejer and Khan (1984). Finally, empirical investigations by Ahmed and Miller (2000), Cruz and Teixeira (1999), Atukeren (2005), and Erden and Holcombe (2005) on the crowding-out and crowding-in effects of public investment produce the mixed results. In Sri Lanka, the government borrows from different internal sources to finance its budget deficit, such as the Central Bank of Sri Lanka as well as private and public banks and the level of borrowing has reached alarming levels. This, in turn, will hamper the government's efforts to reduce the rates of inflation and poverty in the country. Otherwise, this excessive borrowing will create upward pressure on the economy by increasing the circulation of money in the marketplace.

As discussed above, public investment has differing consequences on private investment. While there is a significant number of papers analysing public investment's crowding-out effect on private investment, there are few studies relevant to the Sri Lankan context. Gupta (1992) conducted an empirical study to identify the crowding-out effect in ten Asian countries and revealed that the Ricardian Equivalence Theorem is rejected vis-à-vis India, Sri Lanka, Indonesia, and the Philippines. He also found evidence of crowding out in all the Asian countries studied except India. Chowdhary (2004) conducted a test to estimate the possible impacts of fiscal actions in the five least-developed countries in South Asia. He concluded that the price effect seems to be negative in Sri Lanka, but it is statistically insignificant. Therefore, we can conclude that it has no noticeable impact on the interest rate. Banda and Pridarshanee (2013) examined whether there is a crowding-out effect in Sri Lanka by using time series data from 1960 to 2007. To examine the impact of the budget deficit on private investment, the author used empirical tests based on the neoclassical flexible accelerator and Mundell-Fleming models. The results found that there is an absence of a financial crowding-out effect in Sri Lanka as a result of fiscal expansions. However, there is has been no research conducted in Sri Lanka using recent data. Furthermore, it may be argued that the main center of this study is internal public borrowing because the crowding-out effect is primarily generated by the use of domestic loan sources. Government borrowing from external sources does not impact internal funding and has little impact on private investment. The sources of domestic public financing that are directly relevant to the crowding-out effect include both bank and non-bank sources. However, the previous paper does not take this matter into account when estimating the crowding-out effect in Sri Lanka. Furthermore, a large body of literature has analysed the relationship between public and private investment, and the empirical findings of most provide mixed results. However, there has been limited research in developing, and emerging market economies on the interaction between public and private investment, and the results have likely changed over time because of structural reforms such as the deregulation of goods markets (domestic and foreign).

Given the above background, the main objective of this study is to investigate the relationship between public borrowing from domestic sources and private investment in Sri Lanka by estimating autoregressive distributed lag (ARDL) and vector autoregressive (VAR) models using three independent variables. The paper is organized as follows. The second section provides an in-depth of relevant literature. Empirical evidence of the crowding-out effect as well as its theoretical foundations are discussed. The third section analyses public and private investment in Sri Lanka. The fourth section provides model specifications and estimations. Section fifth analysis the estimated results, and finally, section sixth, concludes the paper and provides policy recommendations.

## 2. Literature Review

According to the crowding-out theory, when a government increases its borrowing to finance increased expenditures, the private sector is crowded out due to higher interest rates. There is some controversy in modern macroeconomics with respect to this effect because scholars disagree about how financial market behavior is affected by increased government borrowing. If expanded borrowings result in higher interest rates, due to increased demand for loanable funds, the private sector will face higher borrowing costs, leading to a reduction in private investment. When this occurs, we say that private investment is crowded out.

Moreover, capital investment and other interest-sensitive expenditures are also subject to the expansionary effects of government borrowings. Decreased capital investment by the business can reduce long-term economic growth. However, this crowding-out effect can be moderated by government expenditures on private-sector products, a multiplier effect. This stimulates fixed investments through the accelerator effect; in other words, private investment crowds in. This accelerator effect becomes more valuable when an economy is suffering from unused industrial capacity during periods of severe recession or depression. If the government finances its budget deficit by merely printing money, crowding out could be avoided. However, this would cause accelerating inflation in the economy.

The impact of public investment operates through various channels. However, most economists and researchers have focused on its potential effect on interest rates. Private investment can be affected by public expenditures either directly (real crowding out) or indirectly (financial crowding out). Engen and Hubbard (2004) studied the magnitude of potential adverse effects depending on the degree to which government borrowing increases interest rates and/or decreases private credit. However, government investment does not contribute to an increase in government revenue or real GDP, which may create other problems, such as public debt or inflation. Higher government spending creates upward pressure on interest rates, which discourages private investment. Other than the potential inflationary impact of government spending, most of the economic literature focuses considerable attention on its crowding-out or crowding-in effect on private investment. For developing countries, several empirical studies have examined the strong, long-run relationship between public and private investment (Atukeren, 2005; Rashid, 2005; Erden & Holcombe 2006). When the public sector borrows a lot of money from domestic sources, it will impact the country's growth. In the case of Sri Lanka, the government must pay serious attention to how an increase in the growth rate can be an accomplishment.

Bahmani-Oskooee (1999) discussed how the aggregate effect of public borrowing on the interest rate could be viewed from multiple perspectives. First, the neo-classical theory of interest rate explains that the financing of a government's budget deficit increases the supply of high-interest government bonds, which decreases private investment and creates a crowding-out effect. Second, the Keynesian theory asserts that expansionary fiscal policy causes little to no increase in interest rates, and will cause a rise in incomes and output. Therefore, according to this theory, there is a crowding-in effect rather than crowding-out (Aschauer, 1989). Third, the Ricardian equivalence theorem introduced by Barro (1974) posits that an increase in the deficit-financed through fiscal spending will be matched by a rise in taxes in the future, so interest rates and private investment will experience no change.

However, if the private fixed investment is crowded out that could be negatively impacted to the long-term economic growth. This can be moderated if the borrowed funds are used to finance productive investment in the country, such as education, research, and the like. However, this situation can be worsened if government investment is not productive or public money is wasted. This crowding-out effect is mainly seen on bank balance sheets. If the governments obtain a one-dollar loan from a bank, the bank will have one less dollar to lend to the private sector. A bank's response to a large amount of public borrowings will be to adjust its loan portfolio optimally, balanced along the risk-return spectrum.

When an economy is already in the potential output, crowding out can create a severe situation for the economy. Under this situation, the expansionary fiscal policy of the government encourages prices increases, which leads to increasing demand for the money. This will cause to the higher interest rates and crowds out an interest-sensitive spending. This can suppress market output, leaving no room for the accelerator effect. In an economy under full

employment, any increase in government purchases can result in resources being taken away from the private sector. That is sometimes identified as real crowding out (Albatel, 2003).

Crowding out of another sort, called the international crowding out, may occur because the prevalence of floating exchange rates; it can be explained by the Mundell-Fleming model. It occurs when government borrowing leads to the higher interest rates, which attract inflows of money in capital accounts from foreign financial markets. That leads to an appreciation of the foreign exchange rate and crowds out domestic exports subject to floating exchange rates. This prevents the demand-promoting impacts of the government deficit, but there are no negative impacts on long-term economic growth.

## *2.1 Empirical Results*

### *2.1.1 Empirical Results Related to the Crowding-out Effect*

Chhibber and van Wijnbergen (1988) estimated results using Turkish data and showed that a huge budget deficit financed by domestic sources results in a decline in private investment, which causes the real rate of interest to increase. They conclude that government sector fixed investment has a substantial and negative effect on private fixed investment. Rossiter (2002) shows that public investment crowded-out private investment, while public investment in structures has a weak crowding-in effect.

Temin and Voth (2005) argued that analysing interest rates are basically misguided; they show that in eighteenth- and early-nineteenth-century England, the private lending market balanced through the quantity ratio. The authors analysed the data by using a VAR model on amounts lent by Hoare's Bank and concludes a substantial crowding-out effect that is a 1% increase in debt led to 1% decrease in private lending significant at the 1% level.

### *2.1.2 Empirical Results Related to the Crowding-in Effect*

Using data from Mexico, Ramirez (1994) shows that the impact of public investment is a crowding-in effect, not a crowding-out one. Ouattara (2004) shows similar results by using Johansen cointegration techniques and a bounds test approach to estimate the long-run private investment function using data from Senegal.

Hyder (2001) estimated the crowding-out hypothesis in Pakistan using the vector error-correction method on gross domestic product, public investment, and private investment. The results show a complementary relationship between public and private investment. Naqvi (2002) estimated the relationship between public investment, economic growth, and private investment in Pakistan. The results show that government investment positively impacts private investment and that economic growth generates both public and private investments.

Chakraborty (2006) analysed real and financial crowding-out effects using an asymmetric vector autoregressive model in India. The results showed that there is no evidence of direct crowding-out of private investment by public investment. The results showed that there is a mutual relationship with these investments. Furthermore, it revealed that there is no evidence of a real crowding-out effect.

Majumder (2007) examined the crowding-out effect of public borrowing on private investment in Bangladesh. The author estimated the investment function by using government borrowing, the interest rate, and GDP. The long-run relationship was estimated using the unit root test, an error correction model, and a co-integration test. The results did not show any crowding-out effect; rather, they showed evidence of a crowding-in effect, though results were somewhat ambiguous.

However, most attention has been given to developing countries with high-interest rates and a history of fiscal management. Mukhtar and Zakaria (2008) examined the relationship between interest rates and budget deficits in Pakistan from 1960 to 2005. The authors conclude that government budget deficits do not significantly impact on the nominal or real interest rate in Pakistan. Moreover, Pandit (2005) investigated the relationship between budget deficits and the long-term nominal interest rate in Nepal, covering the period of 1975-2003. The author concludes that there is a positive correlation, but the relationship between budget deficits and the long-term nominal interest

rate of government securities was insignificant. Also, the author concluded that neither the demand for nor supply of long-term government securities was market-based.

### 2.1.3 Mixed Empirical Results

Erden and Holcombe (2005) estimated the differences between developed and developing countries in terms of the crowding-out effect by assessing the role of public investment as a determinant of private investment. The authors applied a flexible accelerator model of private investment to both developed and developing countries to identify differences in their investment behaviour. The results showed that public investment complements (crowds-in) private investment in developing countries. Moreover, the results showed that, in developing economies, private investment is constrained by the relatively low level of available bank credit. In contrast, the results showed that public investment crowd out private investment in developed economies.

Mitra (2006) estimated the crowding-out effect in India by using a structural vector auto regression (SVAR) model to analyse the behaviour of private investment, government investment, and GDP. The results revealed that public investment crowds out private investment. However, public investment had a positive impact on the country's economy in the long run.

A seminal study conducted by Aisen and Hauner (2008) analysed the impact of budget deficits on interest rates by using the generalized method of moments on panel data from 60 advanced and emerging countries. The authors showed that budget deficits significantly and positively affect interest rates. Furthermore, they explained that these impacts depend on the interaction term, and, when budget deficits or domestic debts are high and financial depth or openness is low, the effect is significant.

Akinboade (2010) examined the relationship between the government budget deficit and interest rate in South Africa using the Granger causality method. The author concluded that the budget deficit had no impact on the interest rate. Chakraborty (2012) examined whether there is any evidence of a financial crowding-out effect due to financial deregulation of the interest rate in India in recent years. The author also found that there is no relationship between budget deficit and interest rates.

Government borrowing impacts private investment through the lending rate, according to the principal. However, in many developing countries like Sri Lanka, the equilibrium interest rate can be insensitive to market perceptions. Reinhart and Sbrancia (2011) argued that government debt does not affect interest rates. However, government debt can affect private credit due to government interventions such as administrative controls (e.g., a high legal reserve ratio, control of interest rates, and direct intervention in credit allocation).

Based on the literature, we can conclude that many factors influence the effect of public borrowing on private investment, and these factors vary from country to country depending on their socioeconomic and political makeup. The effect also depends on the various sectors and industries in each economy. As such, it is difficult to predict the effect for any one country, indicating that further research is needed.

### 3. Analysis of the impact of macroeconomic variables on private investment in Sri Lanka

The main purpose of this section is to analyse the present trends in terms of macroeconomic variables which can impact private investment in Sri Lanka. Figure 1: Public borrowing from domestic sources (PBD) line graph shows the Sri Lanka's public borrowing from domestic sources from 1960 to 2014. Domestic sources are the primary source of funding for the government, and the public debt figures show the money taken by the public sector that is no longer available to potential private users. This discussion centres around internal public borrowing because of its potential crowding-out effect. Government borrowing from external sources does not impact internal fund availability, so it has little impact on private investment. Domestic borrowing from the Central Bank of Sri Lanka also does not play a role in creating any crowding-out effects because its purpose is to fund the government without distorting the funds available to the private sector. Sources of domestic public borrowing that are directly relevant to a crowding-out effect include the bank and non-bank sources.

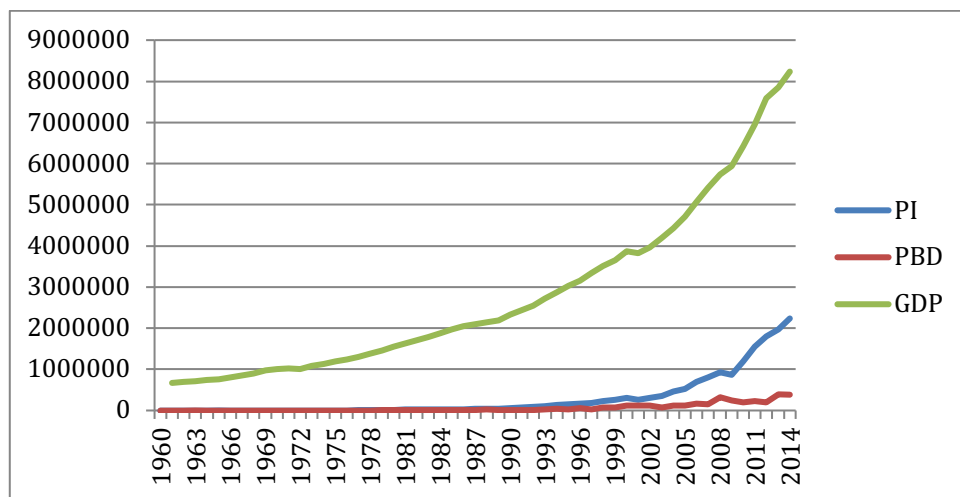


Figure 1. Public borrowing from domestic sources (PBD), Private investment (PI), Gross domestic product (GDP) 1960-2014

Source: Authors' calculations.

Figure 1: public borrowing from domestic sources (PBD) line graph shows the increasing trend in public borrowing from domestic sources (PBD). From 1970 to 1979, the PBD remained flat. From 1979 to 1992, it started to increase slightly, and between 1992 to 1995, PBD decreased somewhat. From 1998 to 2002, PBD increased sharply. The most unique characteristic of this graph is that after 2008, there was a drastic increase in PBD to finance the budget deficit of the country.

Private investment refers to investment made by the private sector, including investments both local and abroad. According to figure 1: private investment line graph shows the, after the 1979 an increase in private investment began, and it increased slightly up to 1990. From 1990 to 2000, it increased, and it decreased slightly between 2000 and 2001. From 2001 to 2008, private investment increased sharply, and it slightly decreased between 2008 and 2009.

Figure 1: gross domestic product line graph shows the country's gross domestic product, which can be defined as the total amount of all goods and services domestically produced. The GDP graph shows an increasing trend, and after 2000 it increased dramatically.

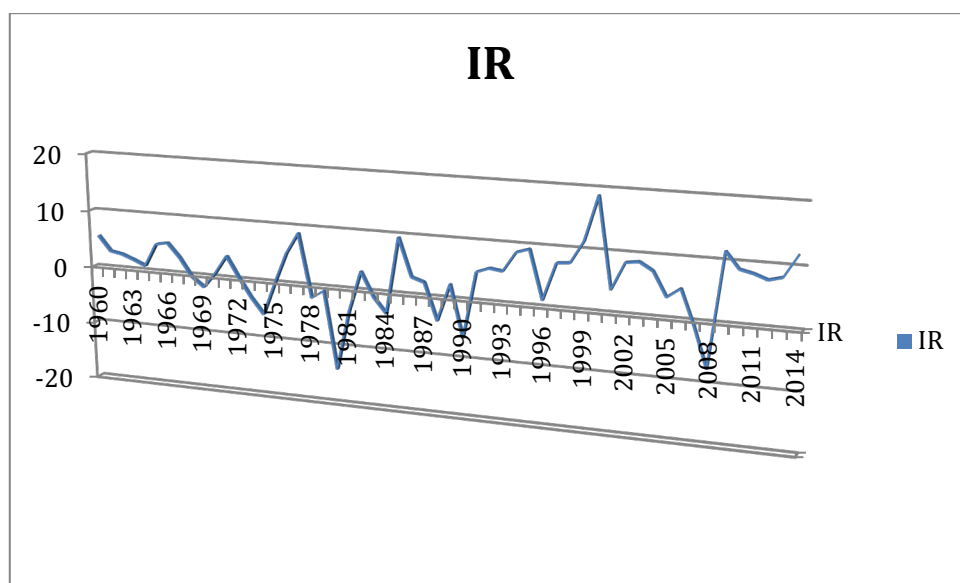


Figure 2. Real interest rate 1960-2014

Figure 2 shows Sri Lanka's real interest rate from 1960-2014. Real interest rate refers to the real weighted average interest rate on advances given by different banks.

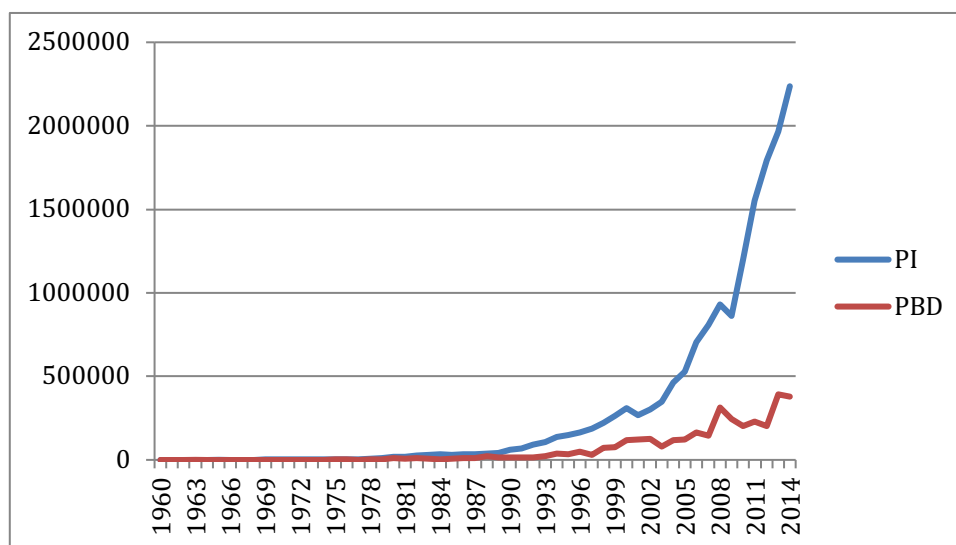


Figure 3. Public borrowing and private investment 1960-2014

Note. Source: Authors' calculations.

Figure 3 superficially indicate a positive relationship between public borrowing and private investment in Sri Lanka. However, the graphical illustration does not provide any evidence regarding the crowding out of the private investment as a result of public borrowing in Sri Lanka. Therefore, we will use an econometric model to empirically identify whether crowding out is an issue in Sri Lanka.

#### 4. Data and Model Specification

##### 4.1 Data

This section presents the basic data used for this study. This study uses extensive time-series data for Sri Lanka for a period of 54 years from 1960 to 2014. The sample data was primarily obtained from The Annual Report of the Central Bank of Sri Lanka (2017) and World Development Indicators.

##### 4.2 Model Specification

Cruz and Teixeira (1999) use four approaches: the computable general equilibrium (CGE) model, the IS-LM model, an estimation of the investment function, and a model of the supply-side impact. Considering its relative advantages and higher relevancy, we selected the investment function approach to address the crowding-out issue in Sri Lanka. To estimate the private investment demand function in Sri Lanka, we focused on domestic public borrowing and gross domestic product as explanatory variables as well as interest on advances (weighted average). According to the theory, the coefficients of GDP are expected to assume positive signs, and those of interest rate are expected to assume negative signs. Public borrowing from domestic sources may be either positive or negative depending on the liquidity position of the country's economy, the psychological effect on private investors, and the nature of loan-backed public expenditures. The theoretical framework shows the relationship between private investment and public borrowing, GDP, and interest rate. It can be expressed in the following function.

$$PI = f(PB, GDP, IR), \quad (1)$$

Where,

PI = Private investment

PB = Public borrowing

GDP = Gross domestic product

IR = Interest rate



#### 4.2.1 Nature of the variables

Private investment refers to investment made by the private sector, including both local and international ones. Public borrowing includes all domestically sourced funds borrowed by the government itself and public sector corporations. Gross domestic product refers to the total amount of goods and services domestically produced. Interest rate refers to the weighted average interest rate on advances given by different banks. All the data for variables is taken in real terms. For convenience, all the analytical variables except real interest rate, that is, real private investment, real public borrowing, and real GDP, data are taken at log level.

The model has the following form:

$$LRPI = f(LRDPB, LRGDP, RIR) \quad (2)$$

#### 4.2.2 Method of Estimation

We use yearly time series data for the analysis, and most of the time series are non-stationary. If the series are non-stationary in the regression, the regression results will suffer from the spurious regression problem. To prevent this, we conduct a prior determination of the unvaried properties of the time series. The series holds the same order of integration, and the combination of non-stationary series that gives a stationary combination can be identified through co-integration techniques. Co-integration testing includes two steps. The first step is checking the stationarity of the data by using unit root tests. The second step is conducting a co-integration test to identify the existence of a long-run relationship. In our analysis, the Augmented Dickey-Fuller (ADF) test is performed to check for the stationarity of the variables. In implementing the ADF unit root test, we verify that each variable in the function is regressed on a constant. We analyse the dynamic interactions and long-run relationships among the variables of private investment in the model using a bounds test of co-integration developed by Pesaran, Shin, and Smith (2001). To establish the existence of a long-run relationship, we use the ARDL co-integration method. The vector error correction method is used to check the speed of adjustment of the variables. We also use VAR models to analyse the results and use a Granger causality test, variance decomposition analysis, and impulse response function techniques.

### 5. Results and Discussion

As a prerequisite for the co-integration test, we use the ADF and Phillips-Perron (PP) tests, including the constant without the deterministic trend and with the deterministic trend. The real interest rate (RIR) only rejects the null hypothesis of a unit root in the level form; therefore, the unit root tests were conducted at the first differences level by using the ADF and PP tests for the other three variables: LRGDP, LRPI, and LRPBD. The results of these tests indicate that the RIR is stationary at the I(0) and the other three variables are stationary at the I(1), as shown in Tables 1 and 2.

Table 1. ADF and PP unit root tests at level

Level	ADF		Phillip Peron Test		Order of Integration
	Constant	Constant with trend	Constant	Constant with trend	
LRPI	0.7708 (0.819)	-2.3019 (0.4255)	0.6805 (0.8427)	-2.1467 (0.5087)	Ho not rejected
LRPBD	-1.1459 (0.6909)	-4.5522** (0.0031)	-1.2753 (0.6347)	-4.4956** (0.0037)	Mixed Results
LRGDP	1.934 (0.9998)	-1.058 (0.9263)	1.8763 (0.9997)	-1.2934 (0.8789)	Ho not rejected
RIR	-4.546*** (0.0005)	-5.33*** (0.0003)	-4.5434*** (0.0005)	-5.3173*** (0.0003)	I(0)

Note. \*, \*\*, \*\*\* indicate rejection of the null hypothesis at the 10, 5, and 1 percent levels of significance. Source: Authors' calculations.

Table 2. ADF and PP unit root tests at first differences

First Difference	ADF		Phillip Peron Test		Order of Integration
	Constant	Constant with trend	Constant	Constant with trend	
LRGDP	-5.6397***	-5.9114***	-5.5783***	-5.7907***	I(1)
LRPI	-5.9912***	-5.9384***	-5.988***	-5.9344***	I(1)
LRPBD	-10.621***	-10.5169***	-16.458***	-16.341***	I(1)

Note. \*, \*\*, \*\*\* indicate rejection of the null hypothesis at the 10, 5, and 1 percent levels of significance. Source: Authors' calculations.

All the variables are non-stationary at the level form except for RIR in both the ADF and PP tests. Therefore, we conducted the unit root test using both the ADF and PP at the first differences, including a constant without the trend and with the trend. The results in Table 2 show that LRGDP, LRPBD, and LRPI are stationary of I (1) at the 1% significance level. The above results indicate conditions for using the ARDL-bound test approach because none of the variables in the model are I(2) or higher.

Table 3. ARDL long-run form and F-bound test

Optimal lag length	(1,4)	
F-Statistic	4.029	
Outcome	Co-integrated	
	Lower Bounds (0)	Upper Bounds (1)
10 percent level	2.508	3.356
5 percent level	2.982	3.942
1 percent level	4.118	5.2

Note. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. Source: Authors' calculations.

Table 3 shows the results of the ARDL long-run form and F-Bound test. According to the bounds testing, the calculated F-statistic is 4.0296, which is greater than the upper bound critical value of 3.942 at the 5% significance level. The results of the bounds testing confirmed the long-run co-integration between private investment, public borrowing from domestic sources, GDP, and interest rate.

To establish the existence of a long-run relationship, we use the ARDL co-integration method and estimate the long-run parameters by using the maximum order of the lag. The model is estimated by using the ARDL (1,0,1,0) specification, and the estimated results are calculated by normalizing private investment in the long run.

Table 4. Result of the ARDL (1,0,1,0) long-run model

Variable	Coefficient	Standard error	T-Statistics	Probability
LRPBD***	0.839967	0.288459	2.911911	0.0055
LRGDP	0.328667	0.421760	0.779276	0.4397
RIR	-0.000631	0.007543	-0.083700	0.9337
C	-1.494383	1.765588	-0.846394	0.4016

Note. Dependent Variable: D (LRPI). \*\* and \*\*\* represent the 5% and 1% significance levels, respectively. Source: Authors' calculations based on CBSL data.

Table 4 shows the result of the ARDL (1,0,1,0) long-run model. The estimated coefficients of the long-run relationship showed that for public borrowing from domestic sources (LRPBD) the coefficient sign is positive and significant at the 1% level. This means that, when all other variables are equal, a 1% increase in LRPBD leads to an approximately 83% increase in the private investment (LRPI). This result provides evidence to conclude an absence of financial crowding out in Sri Lanka and, quite unexpectedly, shows financial crowding in Sri Lanka.

The relationship between GDP and private investment was positive and not statistically significant. According to the LR GDP coefficient, a 1% increase in GDP would increase private investment by approximately 32%.

The coefficient of the real interest rate had a negative sign and was not statistically significant. The RIR coefficient indicated that a 1% increase in the interest rate would lead to a 1.49% decrease in private investment.

Table 5. Diagnostic and specification tests for co-integration

Test Objective	Test	Test Statistics	Probability
Heteroskedasticity	Breusch - Pagan Godfrey	1.626655	0.1715
Serial Correlation	Breusch-Godfrey Serial Correlation LM Test	0.436735	0.6489
Normality	Histogram-normality Test-(Jarque-Bera)	2.083165	0.3528

Note. Source: Authors' calculations.

Table 5 displays the diagnostic and specification tests for co-integration. This study used different diagnostic and specification tests on the error correction model, and the results shown in Table 5. The Breusch-Godfrey serial correlation LM Test does not show any evidence of a serial correlation in the disturbance of the error term. The Breusch-Pagan Godfrey heteroskedasticity test indicated that the errors were independent of the regressors. The Cusum test suggested that the model was correctly specified. The Jarque Bera normality test shows that the errors were normally distributed.

The results of the short-run dynamic obtained from the error correction model (ECM) equation are associated with a long-run relationship.

Table 6. ARDL (1,0,1,0) model error correction model results

Variable	Coefficient	Standard error	T-Statistics	Probability
LRPI(-1)	0.814288	0.067280	12.10301	0.00000
LRPBD	0.155992	0.053557	2.912661	0.0055
LRGDP	4.942668	0.895533	5.519246	0.00000
LRGDP(-1)	-4.881630	0.922675	-5.290735	0.00000
RIR	-0.000117	0.001407	-0.083335	0.9339
C	-0.277525	0.397083	-0.698910	0.4881
CointEq (-1)	-0.185712	0.037470	-4.956362	0.00000

Note. Dependent variable: Private Investment. Source: Authors' calculations based on CBSL Data.

Table 6 shows the ARDL (1,0,1,0) model error correction model results. The value of the equilibrium correction coefficient calculated by the ECM model is -0.1857, and it is highly significant. This indicates a correct sign and a relatively low-speed adjustment towards equilibrium after a shock. The results indicate that the short-run impact

of a change in public borrowing from domestic sources on private investment would be positive at the 10% significance level. Also, LRGDP(-1) shows a negative sign, and the coefficient is significant at the 1% level. GDP shows a positive sign and has a highly substantial degree in the short run. In the short term, the interest rate coefficient is negative and not significant.

We use VAR models to analyse the results, and we use a variance decomposition analysis, Granger causality test, and impulse response function.

Table 7. Granger causality test

Null Hypothesis	Chi-Square	Outcome
LRGDP does not cause the LRPI	2.997519(0.2234)	Accept the null hypothesis
LRPBD does not cause the LRPI	3.309426(0.1911)	Accept the null hypothesis
RIR does not cause the LRPI	0.876210(0.6453)	Accept the null hypothesis
LRPI does not cause the LRGDP	12.04047(0.0024)***	Reject the null hypothesis
LRPBD does not cause the LRGDP	5.367268(0.0683)	Accept the null hypothesis
RIR does not cause the LRGDP	2.477280(0.2898)	Accept the null hypothesis
LRPI does not the LRPBD	8.031584(0.0180)***	Reject the null hypothesis
LRGDP does not cause the LRPBD	0.246268(0.8841)	Accept the null hypothesis
RIR does not cause the LRPBD	0.096280(0.9530)	Accept the null hypothesis
LRPI does not cause the RIR	0.941352(0.6246)	Accept the null hypothesis
LRGDP does not cause the RIR	2.678537(0.2620)	Accept the null hypothesis
LRPBD does not cause the RIR	2.035854(0.3613)	Accept the null hypothesis

Note. Source: Authors' calculations.

Table 7 shows the results of the Granger causality test. The dependent variable interest rate in the table shows the p-values of GDP, PBD, and PI are more than 5%; therefore, we cannot reject the null hypothesis. Rather, we accept the null hypothesis. That means GDP, PBD, or PI cannot affect the interest rate. In the table, the dependent variable GDP shows that the probability values of the interest rate and public borrowing from domestic sources are more than the 5%, so we can conclude that the interest rate and public financing from internal sources cannot affect GDP. However, the p-value of private investment is less than 5%, that means private investment can affect the GDP of Sri Lanka, and the variable is at the 1% significance level. The Granger causality results for the dependent variable PBD show that the interest rate and GDP cannot affect PBD. However, LRPI can affect LRPBD. The results for the dependent variable PI show that the LRGDP, LRPBD, and RIR cannot affect private investment.

### 5.1 Variance Decomposition Analysis

The relative importance of each random shock (or innovation) is shown in the behavior of the variables obtained from the variance decomposition analysis. Variance decomposition helps to quantify the proportion of variations of the dependent variable explained by each of the independent variables. Tables 8 and 9 show the results of the variance decomposition approach, describing the variations in the three variables due to the one standard deviation in innovation.

Table 8. Variance decomposition of LRPI and LRGDP

Period	Variance decomposition of LRPI					Period	Variance decomposition of LRGDP				
	S.E.	LRPI	LRGDP	LRPBD	RIR		S.E.	LRPI	LRGDP	LRPBD	RIR
1	0.06	100.00	0.00	0.00	0.00	1	0.00	26.44	59.27	14.28	0.00
2	0.97	99.00	0.01	0.69	0.28	2	0.01	39.57	39.02	20.3	1.09
3	0.11	98.95	0.05	0.76	0.22	3	0.01	39.91	39.07	18.46	2.53
4	0.12	98.16	0.10	1.34	0.38	4	0.01	38.15	40.9	16.28	4.65
5	0.13	97.47	0.17	1.83	0.50	5	0.01	35.25	43.5	14.96	6.27
6	0.14	96.99	0.26	2.14	0.59	6	0.02	32.11	46.15	14.28	7.45
7	0.14	96.66	0.37	2.3	0.65	7	0.02	29.01	48.6	14.06	8.30
8	0.14	96.42	0.51	2.34	0.71	8	0.02	26.14	50.73	14.18	8.94
9	0.15	96.2	0.67	2.34	0.77	9	0.02	23.57	52.49	14.5	9.42
10	0.15	95.98	0.85	2.32	0.83	10	0.02	21.34	53.93	14.93	9.78

Table 9. Variance decomposition of LRPBD and RIR

Period	Variance decomposition of LRPBD					Period	Variance decomposition of IR				
	S.E.	LRPI	LRGDP	LRPBD	RIR		S.E.	LRPI	LRGDP	LRPBD	RIR
1	0.14	4.74	0.00	95.25	0.00	1	5.24	0.16	0.08	0.54	99.20
2	0.15	13.78	0.42	85.68	0.11	2	5.50	4.55	0.37	0.49	94.57
3	0.16	20.89	0.38	78.15	0.56	3	5.63	5.96	0.37	3.38	90.27
4	0.16	26.29	0.36	72.81	0.53	4	5.69	6.08	0.41	5.01	88.49
5	0.17	29.92	0.36	69.19	0.52	5	5.71	6.13	0.44	5.40	88.01
6	0.17	32.34	0.37	66.74	0.53	6	5.71	6.19	0.46	5.48	87.85
7	0.18	33.91	0.40	65.11	0.56	7	5.71	6.25	0.48	5.49	87.75
8	0.18	34.94	0.44	64.01	0.59	8	5.72	6.30	0.50	5.50	87.67
9	0.18	35.62	0.49	63.26	0.61	9	5.72	6.35	0.52	5.51	87.6
10	0.18	36.07	0.55	62.73	0.63	10	5.72	6.38	0.53	5.52	87.54

In the first and tenth years, the variation in LRPI attributed to LRPI itself is 100 and 95.98 percent, respectively. It seems that the highest share of difference in LRPI is explained by itself. The impact of the LRGDP on LRPI is increasing, in the long run, accounting for 0.00 and 0.85 percent, LRPBD on LRPI is a small increase in the long run, accounting for 0.00 to 2.32 LRPBD on LRPI is a small increase in the long run accounting for 0.00 to 2.32 in the first and tenth years respectively. In the first and tenth years, the variation in LRPI attributed to RIR is 0.00 and 0.83 percent, respectively.

In the first and tenth years, the variation in LRGDP attributed to itself is 59.27 and 53.93 percent, respectively. It seems that the most prominent share of variation in LRGDP is explained by itself. However, in the long run, LRPBD on LRGDP increased from 14.28 to 14.93 in the first and tenth years, respectively. Furthermore, the impact of the IR on LRGDP also increased by 0.00 and 9.78 percent in the first and tenth years, respectively. However, the impact of LRPI on LRGDP is decreasing in the long run, accounting for 26.44 and 21.34 percent in the first and tenth years, respectively.

In the first and tenth years, the variation in LRPBD attributed to LRPBD is 95.25 and 64.01, respectively. It seems that a significant share of change in LRPBD is explained by itself. The long-run impact of the LRPI on LRPBD increased drastically, from 4.74 to 36.07 percent in the first and tenth years, respectively. The impact of RIR on LRPBD also increased in the long term, from 0.00 to 0.63 percent in the first and tenth years, respectively. However, the effect of the LRGDP on LRPBD decreased in the long run, accounting for 0.00 and 0.55 percent in the first and tenth years, respectively.

In the first and tenth years, the variation in RIR attributed to RIR itself is 99.2 and 87.54, respectively. It seems that a higher share of the variation in IR is explained by itself. The impact of the LRPI on the RIR increased in the

long run, from 0.16 to 6.38 percent in the first and tenth years, respectively. The impact of LRGDP on RIR also increased in the long run, from 0.08 to 0.53 percent in the first and tenth years, respectively. The impact of the LRPBD on RIR also decreased in the long run, accounting for 0.54 and 5.52 percent in the first and ten years, respectively.

### 5.2 Impulse Response Analysis

The impulse response functions present the accumulated responses of the variables to a one standard deviation structural shocks. Figure 6 shows the accumulated response of the variables to shocks of one standard deviation. Figure 6. Impulse response functions

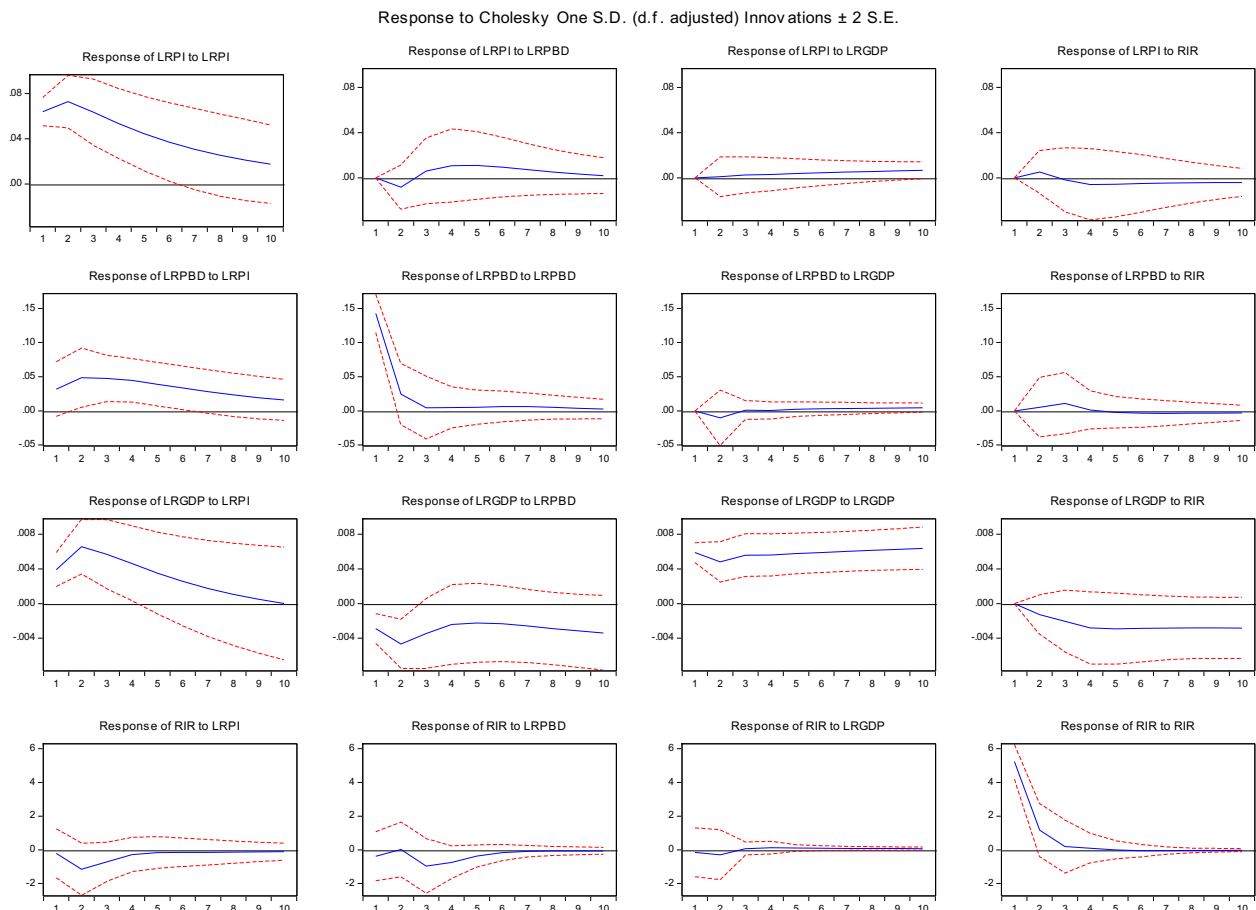


Figure 6. Impulse response functions

The first graph shows the response of LRPI to LRPI explains the effect of one positive shock on one standard deviation to private investment. Private investment will show the increasing positive relationship up to second periods after that will become the decreasing positive relationship. The response of LRGDP to LRPI graph shows that LRGDP will have a positive relationship from one to ten periods. Up to the second year, it shows increase positive relationship after that it will become the decreasing positive association with the LRPI and year 10 it will become zero impact. The response of LRPBD to LRPI graph shows that they will have a positive increasing relationship up to first period after that LRPBD will have decreasing the positive impact on LRPI. The response of the RIR to LRPI graph shows that the RIR will have a negative association with LRPI. Up to first periods, the result shows that the decreasing negative relationship after that up to the fifth period the result shows the increasing negative relationship and become constant up to a ninth period and year 10 it will become the zero impact.

This study provides evidence of a positive relationship between public debt from domestic sources and private investment in Sri Lanka. Public borrowing would not lead to a decrease in private investment in Sri Lanka when increasing the government borrowing from domestic sources increases interest rates by increasing demand for

loanable funds. All other matters being equal, higher prices will lead to reduced investment because of the lower rate of return. However, this means nothing because the Sri Lankan interest rate is directed by the Central Bank of Sri Lanka rather than the automatically adjusted by the market. This shows that the government has effectively used accommodative monetary policy to control the pressure of interest rates and private investment in Sri Lanka in the long run.

Moreover, the Sri Lankan government is able to maintain a positive balance between its capital and financial accounts by adopting unilateral liberalization of its capital account. Sri Lankan government to able do this by borrowing heavily from multilateral and bilateral donors and the Euro dollar markets. Furthermore, the significant values of worker remittances have also helped to manage this positive condition in the county.

## 6. Conclusion and Recommendation

The current study examined the crowding-out effect of public borrowing on private investment in Sri Lanka. The results of the study confirm that there is no crowding-out effect in Sri Lanka from public borrowing. Our estimated results show that when public borrowing from domestic sources is increased, it positively impacts private investment in Sri Lanka. This indicates an absence of the crowding-out effect due to public borrowing from domestic sources. To test reverse causality, we used the Granger causality test, and the results show that private investment can affect GDP and public borrowing in Sri Lanka. There are few findings supporting this positive effect of public borrowing on private investment from a macroeconomic point of view. To do this, we analysed macroeconomic issues and identified factors, such as the employment of effective monetary policy by the government to mitigate the crowding-out effect, liberalization of the financial market, and increased foreign remittance in the recent decades, that create a crowding-in effect rather than a crowding-out one in Sri Lanka.

The absence of a crowding-out effect emphasizes the possibility that governments can finance budget deficits through the domestic sources without influencing private investment. This shows the Central Bank of Sri Lanka has successfully mitigated the crowding-out effect of public borrowing from internal sources through an accommodative monetary policy. Liberalization in the financial markets effects monetary expansions through short-term capital inflows. Therefore, the Sri Lankan government changed its method of borrowing from conventional foreign lenders to some emerging lenders. During the last few decades, this has increased the foreign remittance of the country, and it appears to have eased constraints. This indicates the ability of the Sri Lankan government to employ an accommodative monetary policy to decrease the negative impacts of government borrowing from domestic sources.

## References

- Ahmed, H., & Miller, S. M. (2000). Crowding-out and crowding-in effects of the components of government expenditure. *Contemporary Economic Policy*, 18(1), 124-133. <https://doi.org/10.1111/j.1465-7287.2000.tb00011.x>
- A.A.S.Priyadarshane and O.G.Dayarathna Banda (2013). Budget Deficit and Financial Crowding out-Evidence from Sri Lanka. *Sri Lanka Journal of Economic Research*.
- Aisen, H., and Hauner D.(2008). Budget deficits and interest rates. *IMF working papers, interenational monetary fund*, 08/42.
- Akinboade, O.A. (2004). The relationship between budget deficit and interest rates in South Africa:some econometrics results. *Development Southern Africa*, 21(2).
- Akkina, K. R., & Celebi, M. A. (2002). The determinants of private fixed investment and the relationship between public and private capital accumulation in Turkey. *The Pakistan Development Review*, 41(3), 243-254. <https://www.jstor.org/stable/41260468>
- Albatel, A.H. (2003). Government budget deficit and the crowding out of private sector investment in Saudi Arabia. *Journal of king saud university administrative science quarterly*, 17(1),1-28.
- Aschauer, D. A. (1989). Is public expenditure productive?. *Journal of Monetary Economics*, 23, 177-200. [https://doi.org/10.1016/0304-3932\(89\)90047-0](https://doi.org/10.1016/0304-3932(89)90047-0)
- Atukeren, E. (2005). Interaction between public and private investment: Evidence from developing countries. *Kyklos*, 58(3), 307-330. <https://doi.org/10.1111/j.0023-5962.2005.00290.x>

- Bahmani-Oskooee, M. (1999). Do federal budget deficits crowd out or crowd in private investment?. *Journal of Policy Modeling*, 21(5), 633-640. [https://doi.org/10.1016/S0161-8938\(98\)00005-2](https://doi.org/10.1016/S0161-8938(98)00005-2)
- Barro, R. J. (1974). Are government bonds net wealth?. *Journal of Political Economy*, 82, 1095-1117. <https://doi.org/10.1086/260266>
- Blejer, M.I. and M.S.Khan (1984). Government Policy and Private Investment in Developing countries. *Staff Papers (International Monetary Fund)* 31(2), pp. 379–403.
- Central Bank of Sri Lanka (1960-2017). *Annual report*. Colombo, Sri Lanka: Central Bank of Sri Lanka.
- Chakraborty, L. S. (2006). *Fiscal deficit, capital formation, and crowding-out: Evidence from India* (Working Paper No. 43). New Delhi: National Institute of Public Finance and Policy.
- Chakraborty, L. (2012). Interest rate determination in India: Empirical evidence on fiscal deficit-interest rate linkages and financial crowding out, economics institute Newyork, *Economics working paper archive, wp\_744*.
- Chhibber, A., & van Wijnbergen, S. (1988). *Public policy and private investment in Turkey* (Working Paper No. 120). Policy, Planning and Research Department Working Papers. Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/459531468760494990/Public-policy-and-private-investment-in-Turkey>.
- Chowdhary, K. (2004). Deficit financing in LDEs: Evidence from south asia. *Faculty fo commerce-economics working papers (wp04-18)*, Department of economics, university of Wollongong.
- Cruz, B. O., & Teixeira, J. R. (1999). The impact of public investment on private investment in Brazil, 1947-1990. *Cepal Review*, 67, 75-84. <http://hdl.handle.net/11362/10677>
- Cumbers, A., & Birch, K. (2006). *Public sector spending and regional economic development: Crowding-out or adding value?*. Glasgow: Centre for Public Policy for Regions, University of Glasgow.
- Engen, E. M., & Hubbard, R. G. (2004). Federal government debt and interest rates. *NBER Macroeconomics Annual*, 19, 83-138. <https://doi.org/10.1086/ma.19.3585331>
- Erenburg, S. J. (1993). *The relationship between public and private investment* (Working Paper No. 85). Annandale-on-Hudson, NY: The Jerome Levy Economics Institute. <http://dx.doi.org/10.2139/ssrn.155370>
- Erden, L., & Holcombe, R. G. (2005). The effects of public investment on private investment in developing economies. *Public Finance Review*, 33(5), 575-602. <https://doi.org/10.1177/1091142105277627>
- Erden, L., & Holcombe, R. G. (2006). The linkage between public and private investment: A cointegration analysis of a panel of developing countries. *Eastern Economic Journal*, 32(3), 479-492. <https://www.jstor.org/stable/40326291>
- Greene, J., & Villanueva, D. (1991). Private investment in developing countries: an empirical analysis. *Staff Papers, International Monetary Fund Economic Review*, 38(1), 33-58. <https://doi.org/10.2307/3867034>
- Guptha, K.L. (1992). Budget deficits and economic Activity in Asia. London:Rutledge.
- Hyder, K. (2001). Crowding-out hypothesis in a vector error correction framework: A case study of Pakistan. *The Pakistan Development Review*, 40(4), 633-650. <https://www.jstor.org/stable/41260355>
- Majumder, A. M. (2007). *Does public borrowing crowd-out private investment? The Bangladesh evidence* (Working Paper No. 0708). Dhaka: Bangladesh Bank Policy Analysis Unit.
- Mitra, P. (2006). Has government investment crowded-out private investment in India?. *American Economic Review*, 96(2), 337-341. <https://doi.org/10.1257/000282806777211621>
- Mukhtar, T., & Zakaria, M. (2008). Budget deficits and interest rates: an empirical analysis for Pakistan. *Journal of Economic Cooperation*, 29(2), 1-14.
- Naqvi, N. H. (2002). Crowding-in or crowding-out? Modelling the relationship between public and private fixed capital formation using co-integration analysis: The case of Pakistan 1964-2000. *The Pakistan Development Review*, 41(3), 255-275. <https://www.jstor.org/stable/41260469>
- Ouattara, B. (2004). *Modelling the long run determinants of private investment in Senegal* (Working Paper No. 04/05). Nottingham: The University of Nottingham, Centre for Research in Economic Development and International Trade (CREDIT). <http://hdl.handle.net/10419/8176>
- Pandit R. (2005). The impact of fiscal deficit on long term nominal interest rate in Nepal. *Economic Review*, 113-133. [https://www.nrb.org.np/ecorev/pdf/vol17\\_art6.pdf](https://www.nrb.org.np/ecorev/pdf/vol17_art6.pdf)
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326. <https://doi.org/10.1002/jae.616>
- Ramirez, M. D. (1994). Public and private investment in Mexico, 1950-90: An empirical analysis. *Southern Economic Journal*, 61(1), 1-17. <https://doi.org/10.2307/1060126>
- Rashid, A. (2005). Public/private investment linkages: A multivariate cointegration analysis. *The Pakistan Development Review*, 44(4), 805-817.
- Reinhart, C. M., & Sbrancia, M. B. (2011). *Financial repression redux*, Finance and Development, volume.48, No.2, June.
- Rossiter, R. (2002). Structural cointegration analysis of private and public investment. *International Journal of Business and Economics*, 1(1), 59-67.



Temin, P., & Voth, H. J. (2005). Credit rationing and crowding out during the industrial revolution: Evidence from Hoare's Bank, 1702–1862. *Explorations in Economic History*, 42(3), 325-348.  
<https://doi.org/10.1016/j.eeh.2004.10.004>