

**DOES GOVERNMENT BORROWING AFFECT THE SUPPLY OF PRIVATE-SECTOR
CREDIT? A KENYAN EXPERIENCE.**

BY

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DECLARATION

This Project is my original work and has not been presented for a degree in any other University.

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DEDICATION

To my lovely wife Florence Bhoke Maitaria, my dear sons Baraka Chacha, and Darius Maitaria, and my daughter Joy Robi.

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I give thanks to the Lord God Almighty for His grace and inexhaustible mercy. I thank my supervisor professor Wambugu Anthony for his invaluable contribution and immense valuable input in the success of this research.

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ABSTRACT

Public debt is gaining prominence in Kenyan and African political decision-making. It is also a hot subject in the macroeconomic management in most economies of the world. This study aimed at investigating the effect of Kenya's government borrowing on credit availability to the private sector. More specifically, the study sought to investigate the effect of key macroeconomic variables such as the country's lending rate, actual exchange rates and rate of inflation on credit availability to the private sector. A time series data between 1971 and 2020 from the global development indicators was used. The research used an autoregressive distributed lag model and tested for a long run connection using an ARDL bound test in order to investigate whether or not domestic public debt has an effect on credit extended to the private sector in Kenya. Based on the findings of the estimated model, it was discovered that public debt does not have an effect on credit extended to the private sector, either in the short run or the long run. In light of the three quantity channel theories, the aforementioned points point to the possibility of an excess of liquidity within the banking sector of the nation. From the findings of this study, which showed that the private sector credit was unaffected, the government can borrow in order to reap the benefits of borrowing, such as achieving and maintaining full employment, achieving high economic growth, and maintaining wage and price stability.

CHAPTER ONE

INTRODUCTION

1.1 Background

Private sector is crucial to the development of the economy. Over the past two decades, the private sector's involvement in critical services such as infrastructure, health, and others has grown in importance (Haufler, 2013). In most countries, the private sector accounts for a large portion of national income and it provides employment opportunities to the people. Thus, the rate at which quality job opportunities are made available is critical to development. Increased private sector involvement in an economy is one indicator of economic development. Private companies and entrepreneurs invest in new technologies and manufacturing facilities. In developing countries, the private sector is confronted by a number of limitations in sections such as finance, infrastructure, employee skills, and the investment climate (Anyanwu, Gan & Hu, 2018).

Credit is a type of financial resource that the private sector requires in order to start or expand a business. The magnitude of domestic credit indicates the financial resource that is at the disposal of the private sector (Anyunwui et al., 2007). Its rise leads to the rise in the private sector's growth and development potential. It's growth in developing nations depends heavily on domestic financial institutions. With the help of key money, expertise, relationships, and risk management, they are also able to facilitate the involvement of others in this endeavour. They encourage entrepreneurial inventiveness that is contributing emerging economies to achieve economic growth sustainability. This role is becoming popular with development institutions, in addition to a rise in traditional aid and the loan programs advanced to governments with annual budget deficits that have a tendency to grow in size sporadically (Altaylgil & Akkay, 2013).

The global economy is significantly recovering from the effects of the COVID 19 pandemic, although recovering at an unequal rate. Whereas the developed countries are experiencing a recovery fairly the underdeveloped nation are slugging (Gove, 2022). To counteract the human and economic damages incurred as a result of the epidemic, substantial effort is required.

Furthermore, recovery is not assured: future COVID-19 waves, new delays in vaccine supply, increased debt due to continuous debt, and rising inflationary pressures might all lead to setbacks (Krishnadas, 2020). Governments desire to borrow to fund deficit budgets has led to accumulation of several forms of public debt, which have become a main characteristic of every capital market. It is critical to remember that bonds, notes, bills, and similar instruments are forms that government incur public debt and they require defined payments to holders at stated times.

The last decade has seen a huge, rapid, and widespread rise in global debt size. This pandemic, which accelerated the accumulation of public debt in most economies, exacerbated this trend (Krishnadas, 2020). These build outs emphasize the essence of prudent debt-financed spending. The debt burden in some countries, for instance the United States and a number of developing countries, has been growing steadily (Fukuyama, 2020); (World Bank, 2021). Despite many countries in Europe running current deficits and despite their total debt growing, the rate of growth is frequently much slower than in the United States and often lower than national income growth rate (World Economic Outlook, 2020). Global trends in government borrowing are depicted in Figure 1.1.

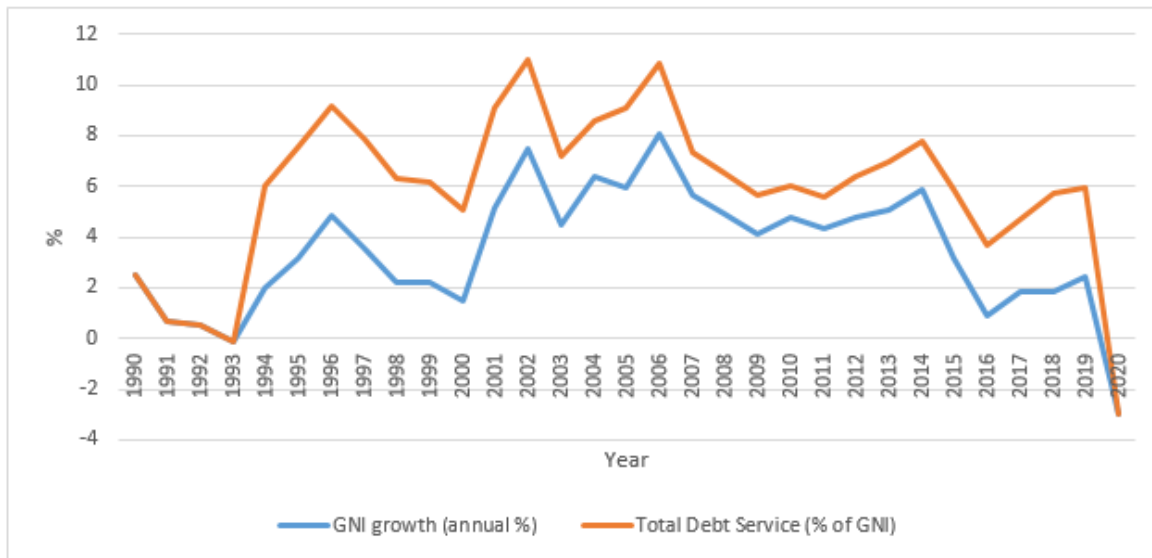


Source: Adapted from World Economic Outlook (2007-2020)

Figure 1. 1 Global Trends on Government Borrowing

As can be observed, globally, there has been unpredictable global debt peaking between 2019 and 2020. This behavior was also observed in 2009 perhaps by global financial crisis of the year 2008. For more than a decade, low interest rates have resulted to a growth of worldwide financial risk, a huge government and private debt in most countries. World Economic Outlook (2020), postulates that the urgency of the COVID-19 epidemic and the great lockdown is to blame for these debt vulnerabilities, which have resulted in greater increases in deficits and debt than during the global financial crisis. To keep people employed, preserve lives, and avoid company bankruptcies while fostering recovery, countries are prepared to spend whatever it takes (Grove et al., 2021). As a result of the banks' reduced capacity to lend to expanding firms because of the low interest rates, borrowers are exposed to rate rises. As the pandemic subsides, macroeconomic policy must gradually normalize in order to maintain price stability and fiscal sustainability (Grove et al., 2021).

Public debt remains a popular component of fiscal policy among many countries in the Sub-Saharan Africa region (SSA) (World Bank, 2021). Public debt is largely viewed as a key input to the growth process in developing economies not only in the SSA region but also elsewhere in the world (Prizzon & Mustapha, 2018). SSA countries' debt stock continues to rise at a rapid pace (IMF, 2018). This is because the region's nations continue to rely on public-sector-led growth, a pattern that continues to suppress the contribution and growth of a strong private sector both directly and indirectly. In most emerging countries, debt stock continues to rise due to the requirement to fund recurring budget deficits derived from inadequate revenue collection and a limited tax base, massive capital expenditures necessary to accelerate the rates of economic growth, a big public sector, and systematic spending inefficiencies (World Bank, 2021).



Source: World Bank (2021)

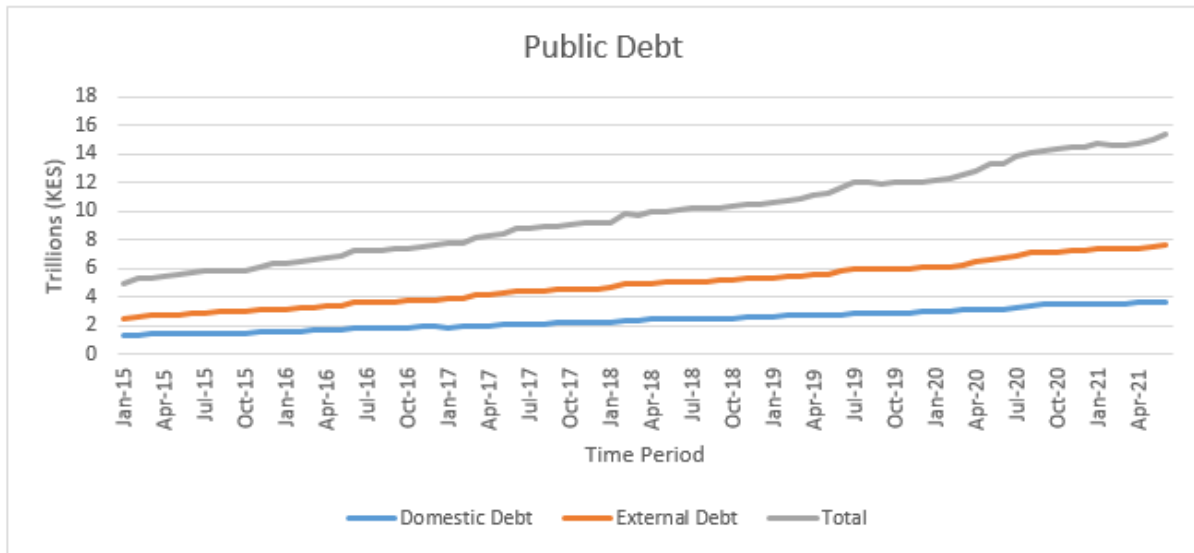
Figure 1. 2 : GNP annual growth rate and governmental debt service trends (% of GNI)

Figure 1.1: Trends in Sub-Saharan Africa's GDP growth rate and debt service (1990-2020). Total debt payment as a proportion of GNI is larger than GNI through time, as illustrated in figure 1.2. It wasn't until 1993 that the two indicators started moving in tandem again. The SSA area has seen a growth in domestic borrowing as well. A bigger share of the burden for regional development falls on domestic credit markets, according to UN Conference on Trade and Development (UNCTAD) (2016). In 2017, the level of domestic debt was roughly 20% of GDP, which supports this claim (International Monetary Fund, 2018). SSA countries are currently under pressure to develop domestic credit markets in order to facilitate flexible alternatives of financing fiscal deficits. In fact, several SSA countries have adopted domestic debt strategies, including extension of maturity periods for long term local currency bonds (International Monetary Fund, 2018).

Like other sub-Saharan Africa countries that fall in the category of Non-Heavily Indebted Poor Countries, Kenya cannot qualify for debt reliefs. As a result, all debt repayments owed by the government are binding in the foreseeable future. That notwithstanding, Kenya's external debt stock has continued to rise in the recent years. Between end of 2009 and end of 2013, for instance,

Kenya's external debt stock rose 27.6% to 29.9% of GNI. This growth occurred at a time when the GNI grew by 13.23%, indicating that gross external debt increased by more than the percentages suggest.

Kenya's total public debt hit Ksh. 5.426 trillion in March 2019 which represented over 57% of the country's GDP. In June 2021, Kenya's total public debt was Ksh. 7.712 trillion. Figure 1.3 presents the trends of public debt in Kenya (Jan, 2015- April, 2021)



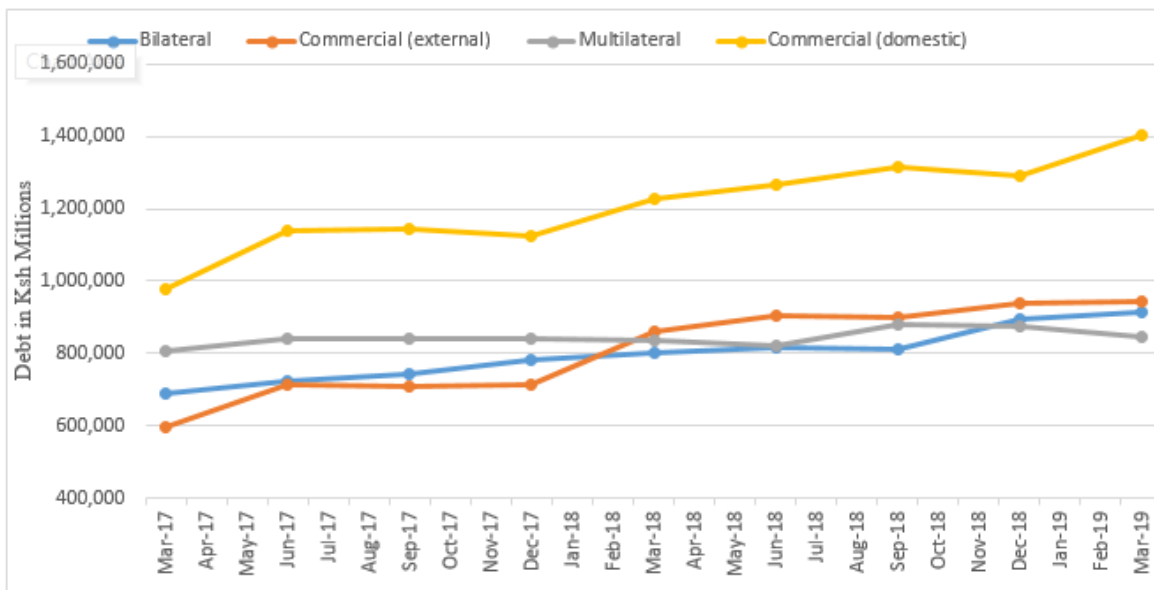
Source of data: The National Treasury

Figure 1. 3 Trends of Public Debt in Kenya (Jan, 2015- April, 2021)

Due to increasing demand for debt and tightening of credit terms for Kenya by international lenders, recent debt figures suggest a departure or stagnation of multilateral credit in favor of commercial loans. The Quarterly Economic and Budgetary Review for March 2019 shows that commercial external debt stock increased by over 58% between March 2017 and March 2019. In addition, the emergence of China as a preferred source of external credit has enhanced the size of over 50 percent of the entire state debt to be made of foreign debt which is split into groupings including multilateral, commercial and debt bilateral. Figure 1.4 below depicts the variations in Kenya's multilateral, commercial and bilateral governmental debt throughout that time period. Kenya's bilateral debt went up by a substantial 33 percent over the same time period. Sovereign borrowing in the domestic market is also following a similar trend with commercial debt increasing

by 44% in the same period. In summary, commercial lenders account for over 43% of Kenya’s total debt.

There is considerable diversion from multilateral to bilateral and commercial lenders, a trend that illustrates the impact of Chinese public debt (bilateral) and hesitance of multilateral bodies to lend to the country. The rise of commercial public debt threatens to crowd out credit markets because, in theory, sovereign bonds are rated as the most risk-secure investment in the market. The worst scenario is the case where domestic commercial public debt reduces the non-public sector’s credit available, hence, dampening investment, job creation and employment rates (Gachoki, 2016). Figure 1.4 presents the trajectory of the various components of Kenya’s stock of public borrowing. The results of the government’s use of commercial loans to fund budget deficits are already having a toll on the domestic credit markets.

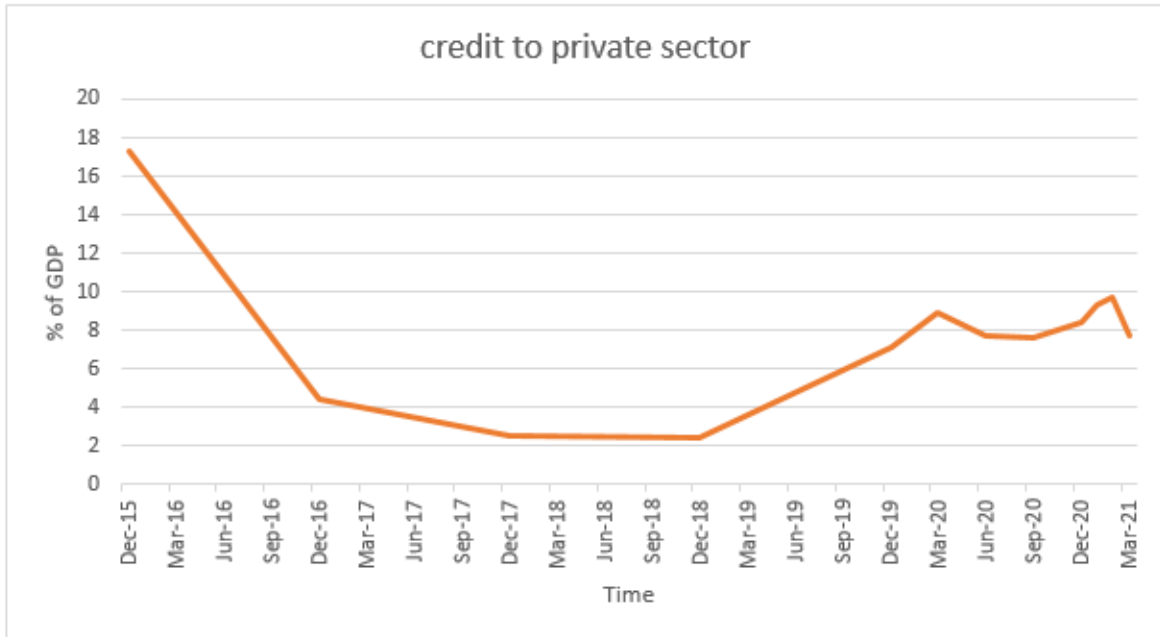


Source: The National Treasury

Figure 1. 4 Trends of the Components of Public Debt in Kenya (2017-2019)

While domestic credit increased by 12.9% in the year to 2019 the month of march, from the central bank, private sector credit increased by 4.6% percent, while credit to the government surged by 53.5% (Central Bank, 2020). This has resulted in a decrease in agricultural loan approvals, although agriculture is amongst the most important drivers of economic development. This

suggests a change in lenders' response to risk and affects sectoral allocation of financial resources within market.



Source: Central Bank (2021)

Figure 1. 5 Private Sector Credit Growth (2015-2021)

From figure 1.5 above, private sector credit declined at an increasing rate between Dec 2015 and Dec 2016 from 17.3% to 4.4% respectively. This further declined to 2.4 percent by December 2018. It also increased at a falling rate to 9% from where it had been regularly increasing. In a period of 4 months December 2020 to March 2021, experienced slight decrease which was 9.7 percent to 7.7 percent (CBK, 2021). This further decreased to 2.4 percent by December 2018. It also grew at a declining rate to 8.9 which was different from its occasional increasing rate.

1.2 Problem Statement

Private sector credit is very important in ensuring economic stability (Gross, 2001). Despite private sector credit being an important component of economic growth and development, public debt (domestic borrowing) has been shown to affect it negatively in most of the developing countries such as Kenya (Putunoi & Mutuku, 2013). From the available statistics, credit to private sector in Kenya was reported at 8.9% in 2020, declining to 7.7% in 2021 (Economic survey, 2021). According to Nyaga (2020), Kenya's debt position is anticipated to get worse, making it unaffordable as increasing debt payment costs reduce spending on important development areas highlighted in the Vision 2030 Blueprint's third medium-term strategy (MTP-III). Unsustainable debt may also cause uncertainty, discourage investment through a shortage of financing for the private sector, negatively impacting growth, and potentially undoing some of the developmental progress gained in recent years (Atta-Mensah & Ibrahim, 2020).

Numerous research on a global and regional scale have been done to examine the link between public borrowing and private sector loans with mixed and diverse focuses (Fayed, 2013; Emran & Farasi, 2018; Anyunwui et al., 2018; Smith et al., 2018; Manda, 2019; Vieira, 2020). Analysis of the causal linkages has been done by others (Marta, 2015; Uttam, 2020). However, there has been no analogous investigation in Kenya. Chebet and Kiemo (2018) explored the correlation that exists between public domestic debt and private sector and commercial banks' lending in Kenya via prices and quantities channels. The two papers relevant to my research are by Chebet & Kiemo (2018) and Mbogo (2017). There was minimal focus on the quantity channel in these studies, which focused exclusively on the interest rate channel. The current research concentrates on the quantity channel. The OLS model employed by Mbogho (2017) included numerous assumptions. Both studies, however, failed to account for structural breaks which is a common phenomenon in economic data. This might have affected the results and hence misleading interpretation and inferences from the results. In order to bridge this gap, an effective theoretical framework and estimable model, such as the dynamic autoregressive distributive lagged model (ARDL), is necessary. On this basis, the present inquiry will be done to address the question, what impact does government debt have on private sector lending in Kenya?

1.3 Research Questions

The following are the study's research questions:

- i. What is the effect of domestic public debt on Credit to Private Sector in Kenya?
- ii. Does the causal relationship persist in the long run?

1.4 Objectives of the Study

1.4.1 General Objective

Determine how government borrowing affect supply of private sector credit in Kenya.

1.4.2 Specific Objectives

- i. To examine the effect of domestic public debt on Credit to Private Sector in Kenya.
- ii. To determine the persistence of the causal relationship in the long run.

1.5 Justification of the study

The financial services sector was the biggest holder of government debt as from the first quarter of 2016, owning over 60 % of Treasury bills and 56 percent of Treasury bonds (Kenya Bankers Association, 2017). The banking industry is essential for mobilizing domestic cash and deposits, distributing them to investments, and managing the risk involved with such enormous economic endeavours. According to the investment-growth relationship, the potential for long-term growth grows directly in proportion to the quantity of money banks lend to the private sector. In this research, we want to bridge knowledge gap on the influence of government borrowing on Kenya's private loan market. Public debt is gaining prominence in Kenyan and African political decision-making. It is also a hot subject in the macroeconomic management of the nation. The findings of this research will guide future economic policy for Kenya and the surrounding area. The findings will also contribute to the literature on private sector credit.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter will give the theoretical discussion that will underpin the research and afterwards moves on to examine the empirical literature, summarising the relationships between the variables of various studies. The overview of the literature provides the research gap in knowledge obtained from the literature reviewed.

2.2 Theoretical Review

Banks serve as a bridge between an economy's surplus and deficit in term of saving and debt respectively. The primary subject of the research will be how domestic governmental debt affects lending in the private sector. By directly or indirectly replacing private sector funding, government debt may have an impact on private sector investment. However, the amount to which public debt increases interest rates and/or restricts access to private borrowing determines the magnitude of these potential negative effects. The following explanations for overpopulation will be looked at in this study.

2.2.1 The Interest Rate channel (Price channel Theory)

The theory was advanced by MacKinnon (1973) & Show (1973). It has the following assumptions, Interest debt is affected by interest rate, increased government borrowing leads to increased interest rate. Increased government borrowing leads to decreased interest rate, Interest rate is neutral to government borrowing.

Because it is believed that prices would not change much in the near term, this, in turn, has an effect on both cost of capital and the country's real interest rate. Therefore, an essential component of this mechanism is the focus placed on the real interest rate as opposed to the nominal interest rate, which influences the choices that consumers and businesses make.

According to Blinder and Solow (1973), there are two variants of crowding output identified that is financial and real output. Direct crowding out occurs when a substitution relationship occurs

between private and public spending. Direct crowding out occurs through public sector investment and consumption. However, the sector is unaffected by adjustments in prices, rates of interest, and required rate of return. The real crowding occurs when public investment increases to the point where capital formation is displaced (Ganelli, 2003). As previously observed, the government's use of bond financing has resulted in a reduction in private capital development in the economy. Crowding out is the term used to describe this phenomenon. Crowding in, on the other hand, occurs as a result of private behavior changes brought about by budget co-starring. Furthermore, it can occur as a result of price changes induced by private agents in response to fluctuations in the interest rate. To understand the changes in interest rates that results from changes in government borrowing, a model of aggregate production is employed illustrating how the economy depicts debts crowds the physical capital production. The Cobb-Douglas production function explains how the interest rates influence productivity. According to the model, rates of interest (r) are controlled by marginal productivity of capital, which rises when capital (k) declines, therefore crowding out.

The model is expressed as

$$Y = F(K, L, A)$$

Where Y equals aggregate demand, which relies on aggregates of capital and labour and level of Technological A_t

In this case Capital(K) will be denoted by private investment

$$Y_t = \{(1 - AK)K_t\}$$

$1-AK$ = fraction of capital employed in production

$1-AL$ = fraction of labour employed in production

A_t = level of Technology in given time period

A rise in exogenous governmental debt causes an increase in interest rates. Thus, the level of interest rates is determined by the degree of government debt-influenced capital stock. This influence of the government debt on interest rates.

A rise in exogenous governmental debt causes an increase in interest rates. Thus, intuitively, this may imply that interest rates levels are determined by the degree of government debt-influenced capital stock. This influence of the government debt on interest rates.

Emran and Farazi (2009) demonstrate government borrowing's effect on interest rates in a number of different dimensions. When it comes to explaining the concept of budget deficit, the classical theory suggests that a rise in government bond supply with a high coupon discourages private investment, leading to a phenomenon known as "crowding out." Additionally, Keynesian views changes in government's fiscal policy to have trivial effects on interest rates. This variation will result in a rise in output and income rather than a rise in interest rates that leads to crowding-in rather than crowding-out. Also in this chapter, Ricardo supports a theory given by Barro (1974), saying that a rise in the deficit resulting from government expenditure can be justified by future increased taxes, given that private investment and interest rates stay stable over time.

Some scholars, like Bernanke and Gertler, claim that this theory is flawed since they had trouble detecting substantial impacts of interest rates on capital costs in their empirical investigations. Economists also have an issue with the concept that monetary policy has the biggest influence on interest rates in the short run. Notably, the monetary policy is inefficient in influencing the long run real rate and, therefore, on the acquisition of long-term assets since this rate is an overnight rate. Finally, the banking system's credit activity is ignored by this process. As a result of this shortcoming, other monetary policy transmission channels, notably the credit channel, were boosted.

2.2.2 The Credit Channel (Quantitative Channel Theory)

Bernanke and Gertler, (1995) proposed the quantitative theory. It states that government debt only affects private credit and not interest rates because of government interventions such as administrative procedures which limit institutions from entering the market. According to Kolmakov et al., (2017), the rate at which the government borrows impacts private investment; this normally takes place in developing economies with unstable economy. Thus, market fluctuations don't affect interest rates. Thus, the government does credit rationing by not implementing a higher interest rate. Thus, this government intervention return on the project cannot be allocated according to the returns but consider the size of the guarantors of the loan within the institution. Therefore, in case the interest rate happens to be weak the effect of borrowing by current government will affect the quantity of the channel. According to the

assumptions of the credit channel theory, changes in the external finance premium enhance returns thus having monetary policy affecting the country's interest rates.

The magnitude of the external financing premiums reflects credit market inefficiencies, which create a disparity in between projected returns on investment and the expenditures. Notably, "credit viewpoint," opines that monetary policy changes have a likelihood of affecting interest rates of the open-market, there is a propensity for the external financing premium to fluctuate as well. As a consequence of this, the country's real spending and activity is affected. Because of the expansionary central bank policy influence on the external financing premiums, this is the case.

Ulu et al. (2017) argues that the nature of the bank of a country's endogenous response to increased government borrowing and balance sheet modification determines the degree of quantitative crowding. Banks will adjust their loan portfolio optimizations in response to increased government borrowing on the basis of different liabilities and assets. For example, in the private sector, if banks have excess liquidity, increased government borrowing may not result in credit contraction. Access to secure government assets may also allow banks to accept more risk, which may result in an increase in loaning to the non-public sector, which is considered by many lenders as a safe asset model under which borrowers may face higher borrowing costs in the absence of public debt (Morales, Osorio, Lemus, & Sarmiento, 2021). If banks respond in this endogenous manner, it is possible that they will be able to 'crowd in' private loans and with the conventional crowding-out being partially offset.

The high yields on government treasury bills, which range from single digits to double digits, may be appealing to invest by many banks rather than actually intermediating to private sector (Baoko, Acheampong, & Ibrahim, 2017). As a result, the distinctiveness of credit channel distinct to that of the classical channel of the interest-rate, monetary policy has been widely demonstrated. It is less clear whether changes in aggregate lending or changes in borrowers' collective risk drive the credit channel. The use of a single channel for the bank lending (Itimu & Abdul, 2018) channel and the balance sheet (Bernanke, Alpanda, & Aysun, 2018) channel has been proposed as the best option (Bernanke, Alpanda, & Aysun, 2018). The primary contribution of the current study is to distinguish between the operation of Kenya's bank lending in the monetary policy transmission and balance sheet channels.

2.3 Empirical Literature Review

By using the domestic banking sector, Kabir and Flath, (2020) investigated the private sector credit's crowding out that are mainly induced by public debt. The research used an imbalanced panel data collection including 73 nations and averaging across 4 consecutive five-year periods between 1995 and 2014. It comprises both high-income and underdeveloped nations. Using basic and multivariate regression models of analysis, the study discovered that government debt held by banks has an impact on the bank lending which crowd out the private sector dollar-for-dollar, and that this is true for both emerging and high-income nations. Consistent with domestic sovereign debt being deposited with banks at market rates and with banks managing their private loans with the goal of maintaining steady capital ratios, the research found.

Manda (2019) conducted research utilizing monthly data from 2012 to 2018 to study the effect of debt by the government on private sector loans in Zimbabwe. Since 2012, the increase in Zimbabwe's national debt has sparked worries over the likely influence of debt of the governed and government's domestic investment spending. Employing unconstrained VAR model, the study discovered an insignificant and negative association between government credit to government to private, indicating that lending to the public may, after all result to the crowded out private credit. Furthermore, the impulse response functions showed that private sector loans had a small response to shocks in the public sector. It was discovered, however, through the variance decomposition research, that the consumer price index was responsible for 31.2% of the variation in loans to the private sector during the sixth period studied. In addition to interest rates and manufacturing volume index, government credit had no substantial impact on the fluctuations in private sector loans and other control variables.

If a government's tax revenues aren't enough to cover its financial needs, it will frequently borrow money from both the domestic and international markets. Thilanka & Ranjith (2018), their investigation of government debt on investment quantity of the private sector: Sri Lankan experience utilizing data from 1978 to 2015. These effects were examined using a variety of econometric methods, such as the long-term unit root test, Johansen cointegration test, and the VECM model. The study's empirical results showed that public debt had a long-term crowding-in influence on private investment, indicating that the government had redirected borrowing money to boost the private sector. The positive impact of real GDP on private investment suggests that the economy will continuously grow in the coming years as well. As a result, the development of a fiscal operations strategy should be geared toward prudent borrowing in order to further stimulate private investment.

Abubakar (2018) conducted a study on the influence of state debt on private sector loans in Nigeria from 1986 to 2018, using the Impulse Response Function. The study replaces state debt with domestic and foreign borrowing. The findings indicated that the Augmented Dickey Test, all the secondary time series data are stationary at first difference. The Long relationship test was completed using the Johansen-integration test. The test for co-integration indicates absence of co-integration between the variables. The impulse response function showed that a shock to domestic debt had a big positive influence on credit to the private sector, but a change to foreign debt had a significant negative influence on credit to the private sector. It was concluded that domestic debt in Nigeria restricted private sector credit, whereas foreign debt eliminated the availability of private sector credit altogether in Nigeria. After conducting this study, it was recommended that Nigeria's central bank continue to implement sound monetary and credit

policies that promote fiscal stability and increase the accessibility of loanable funds for the private sector.

Such riskless paper only comes from the government; thus, the government trades off short-term debt's premium against the refinancing risk it faces since it has to roll over its debt more often. Bahamas, Latoya and Lynsey (2018) conducted research to see whether greater government debt from the banking sector has a detrimental impact on private sector lending." Johansen Co-integration test and VECM were both used in the research. Results from a model based on yearly data from the Bahamas Central Bank from 1985 to 2017 show a short-term effect of crowding out, but it has no long-term impact. The short and long-term link between private sector credit and bank lending rates was shown to be negative. In addition, GDP growth showed a favorable short-term association with private sector credit, but it had a minimal long-term influence on credit.

Oil-dependent nations had more liquid banks, greater capitalization, and higher profits. However, bank lending to the private sector was very low as a percentage of GDP. Anyanwu, Gan, and Hu (2018) did a study on oil-dependent nations' government debt and private sector loans as well as crowding out. Credit to the Private Sector and Exclusion in Oil-Reliant Countries. Public domestic debt in 28 oil-dependent nations from 1990 to 2012 was studied utilized a panel data model. In order to develop the model, the researchers employed fixed effects and an extended technique of moments. According to the study's results, government debt from local banks cuts private sector credit by 0.22 percent, but had no influence on the interest rates that banks charge private sector borrowers. Rather than relying on the interest rate channel, the researchers found that a reduction in private lending was caused by government domestic borrowing.

Chebet and Kiemo (2017) evaluated both price and quantity channels of the possible relationship between domestic governments withdrawing from private sector and commercial banks' lending

in Kenya. According to the results of the research, the method by which crowding-in or crowding-out occurred, as well as the amount and duration of the influence on private sector lending. The research used the ARDL model and impulse response functions to characterize the dynamics of public debt and private sector lending. The study's findings found that public domestic debt from the banking sector hinders investment, as each shilling provided to the public by the banking sector lowers private sector credit by 15 cents. Findings shows that crowding out is common through the quantity channels, in which public debt compete with loanable money that the private sector then would loan. Although the price channel was there, it had a muted effect, and the crowding out that occurs via the quantity channel is shown through impulse response functions fades away in the two-year time frame. Furthermore, private sector lending had more growth-stimulating than government debt from the banking sector, even if both were transitory.

Mbogho (2017) analyzed the influence of government borrowings on private credit levels in Kenya between 2008 and 2016 using an investment function with three response variables, namely bonds, treasury bills and the central bank overdraft. The response variable was credit to the private sector. The research employed secondary data from the Kenyan Central Bank and Kenya National Bureau of Statistics (KNBS). SPSS was utilized to do the linear regression. The research revealed that domestic borrowing levels had a negative effect on private investment. Furthermore, data revealed that public investment had a lesser effect on private investment than public domestic debt, indicating that public investment was not complementary to private investment. Variations in interest rates had harmed private investments; on the other hand, rise in GDP had caused an increase in private investments. In view of the nation's urgent need to accelerate creation of employment, fulfill the Millennium Development Goals, and accomplish Vision 2030 objectives, the findings had substantial fiscal implications.

Zaheer, Khaliq, and Rafiq (2017) investigated the influence of Pakistan's government borrowing through Allied Bank of Pakistan on private sector borrowing. Co-integration tests and the VECM model were employed to analyze data from June 1998 through December 2015, which indicated the short-term and long-term changes in government credit compared to the private sectors. There was a direct correlation between the amount of government borrowing and the amount of money available to private enterprises, according to study. The research found that government borrowing had a negative influence on private sector lending, despite the fact that the impact was minor. Since August 2009, when the interest rate corridor was created, the results have stayed constant.

Developing nations have seen a huge surge in government borrowing from local banks since the late 1990s. The impact of these events on private credit has grown more significant in policy research over the last several decades. In the conventional perspective, government debt authority obtains funds for its own utilization, leaving the private sector with a lesser part. Fayed (2013) investigated the crowding out impact of government debt in Egypt, using lag length provided in the unconstrained VAR to estimate the ECM's estimated outcomes. Specifically, the research looked at the "quantity channel" of crowding out private investment in Egypt, which is a sort of exclusionary pricing behavior. The analysis indicated that government debt from local banks crowded out private lending by a ratio of more than one. The study findings also suggested that government borrowing from banks wasn't the only factor slowing private credit growth down. In the policy literature, the risk of government debt from the local banking sector crowding out private credit and its negative influence on private investment was often discussed. Private investment in underdeveloped nations relies heavily on the convenience of bank loans, given the absence of a capital market.

2.4 Overview of Literature

From the literature assessment that government borrowing is a topic that should be studied more closely because of its frequency, especially in developing nations where fiscal deficits are virtually always present and government borrowing is used to both cover the gap and strengthen the economy. When several economic measures are put in place, the millennial goals and the economy will be negatively affected.

Government debt has a strong correlation with economic downturn. Inflation, loan interest costs, and lenders' risk appetite are all factors that affect private sector lending, especially under rate-capping regimes where lenders prefer to lend more to the government and to fewer borrowers with lower default risks. Those who fall into the group of high default risk borrowers have no additional incentive to provide to lenders to attract them to access their funds because of the interest rate limit, unlike eager borrowers with low default risk. Since investment levels are expected to continue to drop, the economy will be compelled to decrease in the long term. This is a significant threat to the economy.

The relationship between state debt and private sector lending has been studied extensively at both the global and regional levels. Among them are; Emran & Farasi (2018) in the United States, Anyunwui et al. (2018) in New Zealand, Latoya et al. (2018) in Egypt, Fayed (2013) in Egypt and Manda (2019) in Zimbabwe. Furthermore, Marta (2015) and Uttam (2020) evaluated the causal link between private sector credit growth and economic growth and the relationship between public debt and economic development. There was no examination of the causal link between state debt and private sector loan expansion in this research. We admit that study has been undertaken to demonstrate the relationship between domestic borrowing as well as the expansion of private sector credit, but the majority of these studies has concentrated on the industrialized nations, and

the impact of government borrowing in developing nations like Kenya has received little attention. As a result, the analysis did not take into consideration structural breakdowns in economic data, a regular event. Many diagnostic tests including structural fractures will be performed with the use of an advanced autoregressive distributive lag model in this present research.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

According to Kothari (2004), the goal of the methodology is to present specifics about techniques employed in performing the research. This chapter spells out the approach to be utilized in the research. The section includes the theoretical framework, empirical model, diagnostic tests, estimation technique and eventually the data sources and data type.

3.2 Theoretical Framework

This study employed a modified Solow- Swan Model 1956 to address the study objective. The Cobb-Douglas production function explains how the public debt affect the credit to private sector. Based on the model, interest rates (r) are controlled by the marginal productivity of capital that rises when capital (k) falls, which in turn makes it more difficult for the government to service its debt (D).

The model is presented as follows:

$$Y = F(K, L) \dots \dots \dots 3.1$$

Y represent aggregate demand; K represent capital and labour is represented by L.

When technology is introduced into the model, the models become;

$$Y_t = (K_t)^\alpha [A_t (L_t)]^{1-\alpha} \quad 0 < \alpha < 1 \dots \dots \dots 3.2$$

Where K_t is the capital input, L_t Represent labour input while A_t indicate advancement in technology during time t. The parameters α and $1-\alpha$ represent the capital share in the production and labour share in the production respectively. According to Solow model, population growth and technology development are derived externally and are therefore considered as exogenous. Let's say we make the assumption that the amount of production that is invested remains the same. In addition, if we let y is given Y/AL) while k is given by K/AL . Therefore, one definition for output growth k is as follows:

$$k_t^* = sy_t - (n + g + \delta)k_t = sk_t^\alpha - (n + g + \delta)k_t \dots \dots \dots 3.3$$

Where δ represent the constant rate of depreciation. The change in capita per capital each period is determined by per capita investment, per capital depreciation and per capita growth. Solow observes that the sources of increase in per capita output therefore is capital deepening which in this case is represented by private sector credit.

Government borrowing has an effect on interest rates in several ways. When it comes to explaining the concept of budget deficit, proponents of the classical theory suggested that a rise in the government bonds supply with a high coupon discourages private investment, leads to a phenomenon known as "crowding out"(Emran & Farazi ,2009). This modification will lead to an increment in production as well as income instead of an increase in interest rates, which will result to a crowding-in instead of crowding-out as a consequence of the change. Ricardo in defence of a theory advocated by Barro (1974) argues that a rise in the deficit that's been generated by fiscal expenditure can be justified by future increment in taxation, particularly in situations of constant interest rate and private investment. Chebet and Kiemo (2018) say that a small change in interest rate result to more than proportionate change in the case of fiscal policy. This is in agreement with the crowding effect explained in the pricing channel.

3.3 Empirical Model

3.3.1 Specified Model

The estimable model will be estimated via the following specified model;

$$C_t = \beta_0 + \beta_1 C_{t-i} + \beta_2 G_t + \beta_3 G_{t-j} + \beta' x_t' + \mu_t \dots \dots \dots (3.4)$$

Where C_t Credit indicates to Private Sector at time t, C_{t-1} is Credit to Private Sector in the previous period's t-i, G_t is government borrowing at time period t, G_{t-j} represent government borrowing at time period t-j. Also, β_0 represent constant coefficient, β_{1-3} is coefficient for Credit to Private Sector of previous years and public debt as well as their lags. On the other hand, β' is a vector indicating coefficients of other covariates (control variables) including interest rates, whereas x_t' is the vector of other covariates. From the estimable model, the refined model to be employed in the analysis is given as;

$$C_t = \beta_0 + \beta_1 C_{t-i} + \beta_2 G_t + \beta_3 G_{t-j} + \beta_4 INF_t + \beta_5 R_t + \beta_5 EX_t + \mu_t \dots \dots \dots (3.5)$$

Where:

C_t Is private sector credit at time t ;

INF_t Represent the inflation rate in time period t ;

G_t Represent government borrowing at time period t ;

R_t Represent lending rate in time period t ;

EX_t Real exchange rates in time t ;

ε_t Indicate error term for time period t ;

β_0 Represent constant term.

3.3.2 Variable Description and Measurement

Variable	Definition	measurement	Expected Signs	Source
Credit to Private Sector (C)	Resources in form of finances supplied to the private institution by banking institutions, such as lines of credit, acquisitions of non-equity instruments, as well as trade receivables, which create a claim for repayment.	Total advances to private institution in billion KES as % GDP.		Emran and Farazi (2009)
Government Borrowing (G)	A loan that the government has taken out that is included in the Budget paper as a capital receipt.	It is a continuous variable measured as the total annual domestic government debt in KSH as % of GDP.	-/+	Chebet and Kiemo (2018)
Lending Interest rate (R)	The amount a lender charges a borrower and is a percentage of the principal—the amount loaned.	It is measured as annual average interest rate.	-	Altaylıgil and Akkay (2013); Mbate (2013)
Inflation rate (INF)	The overall upward trend in the pricing of goods and services throughout an economy over a predetermined amount of time is what economists refer to as inflation.	. It is a continuous variable. Measured as a % change in CPI.	-	Mukui (2013)
Real exchange rate (EX)	This is the Country's value of currency in relation to the other world currencies.	It is a continuous variable measured as the exchange rate of world currencies against Kenya shilling.	-	Mukui (2013); Lidiema (2017)

From the table above the government borrowing can assume either a negative or the positive sign. It is positive because as the public borrowing increase the government is able to increase liquidity in the economy hence increasing the credit to private sectors. Contrary an increase in public borrowing may lead to crowding out hence decline in the lending to public.

It is anticipated that lending interest, the currency rate, and inflation will all have a negative sign. Notably, as interest rates, currency rates, and inflation rise, there is a corresponding reduction in liquidity in the economy. As a result of this, there is a crowding out effect, which causes private sectors to get less credit in the long run.

3.4. Pre- estimation Tests

To ensure the predictability of our variables, we used several time series tests, including the normality test, the unit root test, and a descriptive statistical test.

3.4.1 Normality Test

This statistical test determines whether or not data set can be explained through a normal distribution as well the frequency of the random variables becoming normally distributed. In this study, Shapiro wilk test was employed. The hypothesis state that;

H_0 : normal distribution.

H_1 : no normal distribution.

An insignificant p value indicates that the data are normal (Wakyereza, 2017). If it is not normally distributed, the data should be analysed using a nonlinear model.

3.4.2 Test for Auto-correlation

Breusch pagan test was employed in testing the existence of autocorrelation. This test aimed at identifying whether the previous and the current error term are correlated. The hypothesis expressed as follows;

H0: residues have no autocorrelation.

H1: residues have an autocorrelation.

If the probability values obtained from the Breusch pagan test is found to exceed the benchmark value of 0.05, the implication is that we fail to reject the null hypothesis, indicating the absence of residual autocorrelation.

3.4.2 Multicollinearity Test

The assumption of multicollinearity exists when independent variables are linearly related on one another. If that's the case, the inconsistency of estimated parameters will increase, resulting in a higher proportion of inaccurate estimations for coefficients and signs, which will lead to bad and incorrect conclusions. A correlation analysis was utilized to determine its presence. If a correlation has been proven to exist, one of the variables in that pair is maintained if not highly correlated or if the sample size is big. Likewise, it may be concealed if these requirements are not satisfied (Alita, Putra & Darwis. 2021).

3.4.3 Test for Structural Breaks

Given that series of event that have transpired within the period being considered in this study like political instability has the potential to alter or cause a shift in the variables being used, the study will conduct a test for structural break. To test this, the Zivot - Andrew's test (1990) was employed. Zivot Andrews tests for the unit root and allows for the break.

3.5. Post- estimation Tests.

3.5.1 Heteroscedasticity Test

Heteroscedasticity is present when there is a variation in the errors across the independent variables. Because statistical significance tests depend on the assumption of uncorrelated and consistent modelling mistakes, the very fact that they exist renders such tests meaningless. The Breusch–Pagan test was employed in order to establish the existence of Heteroscedasticity (Khaled, Lin, Han, Zhao & Hao, 2019). If the p-value > 0.05 , the assumption of homoscedasticity is upheld. In the event that the assumption of homoscedasticity is broken, the data is converted, and weighted least square regression is used.

3.5.2 Unit Root Test

In addition to ADF test, Zivot Andrews unit root test was utilised to test for of the data set in this research. The ADF test was conducted for all variables at level and for variables with unit root differencing was undertaken until the variable became stationary. The hypothesis is given as follows:

Ho: unit root.

Ha: no unit root.

However, ADF Test has low statistical power for making a distinction real and near unit root processes. In addition, according to a number of academics, the ADF test typically contradicts the non-stationarity hypothesis when the series in question contains substantial (long-run) moving average processes. However, in this study, there was no evidence or doubt, hence ADF was used.

3.6 Model Selection

In estimating the model to employ in the analysis, ADF test for unit root is used. OLS model of analysis is appropriate if all variables of interest are stationary at level. However, in the case of variables with unit root at level but becomes stationary after first difference, co-integration test is conducted. When the results show the absence of co-integration, Univariate Autoregressive (VAR) model is selected but if the co-integration is revealed to be present, the appropriate model for analysis is VECM. Moreover, when the ADF test reveals that some are stationary at level and

some stationary after the first difference, Autoregressive Distributed Lag model shall be selected. (Pesaran & Shin, 1995; Pesaran et al., 1996b). In this study ARDL co-integration technique was appropriate mainly due to its superiority of not requiring a priori testing for presence of unit roots. Nkoro & Uko, (2016) opines that ARDL is the most appropriate when variables are integrated differently but the highest order is one (that is, we have some variable integrated of I (0) and others of I (1)). Further, Fouda (2010) suggests that ARDL, when dealing with the problems related to distributed lag, it is usually the most appropriate than VAR. however, in the event that any of the variable will integrated of higher order than one, then ARDL will be inefficient and thus inappropriate.

The study- further performed co-integration analysis and from the co-integration test, ARDL model was estimated ultimately. The practicability of this model follows its adoption in exploring the short or long run effects of economic variables and use by Chebet and Kiemo (2018) and most recently by Ivandra (2020) on financial and monetary aspects in the process of economic recovery in Mozambique.

The steps of the ARDL involves; determining the optimal lags, perform the co-integration, then eventually testing for the existence of the long run relationship (using appropriate tests such as bound test).

3.7 Source of Data

Data used was mainly from secondary source. These secondary sources were from world development indicators. The reason for the choice of secondary data is due to the fact that it is readily available. The study used the secondary data since the variables are readily available from the specified source. The data was for the period of 50 years from 1971 to 2020 resulting to 50 observations count in the analysis.

CHAPTER FOUR

EMPERICAL RESULTS AND DISCUSSION

4.1 Introduction

Analysis and discussions of the study findings are presented in this subsection. The order of discussions starts with a descriptive of the variables used and then diagnostic tests outcomes and the inferential statistics followed by their finding's explanation.

4.2 Descriptive statistics

To understand how the independent and dependent variables are distributed, a descriptive statistic including the variable average and their deviations, the maximum, the minimum is computed and discussed. The findings are represented in Table 4.1.

Table 4. 1 Descriptive Statistics

Variables	Observations	Mean	Std. Deviation.	Minimum	Maximum
Credit to Private sector	50	24.05	6.093	16.49	40.20
Public debt	50	9.215	3.129	1.047	15.24
Exchange rate	50	49.89	35.15	7.001	106.5
Inflation	50	11.69	7.981	1.554	45.98
Lending interest rate	50	16.47	6.602	9	36.24

The findings of table 4.1 revealed that public debt has an average value of 9.215 with the least value being 1.047 while the maximum was 15.24 over the entire period. Also, Inflation Rate has an average value 11.69 with the minimum being 1.554 while the maximum was 45.98 over the entire period.

Lending Interest Rate had an average value 16.465 with a maximum value 36.24 and a minimum of 9. Further, on average Exchange rate value was about 49.89 with the least being 7.001 while the maximum was 106.5 over the entire period.

4.3 Correlation analysis

It is used for measuring association of the dependent and predictor variables. The relationship should not exceed the threshold of 0.6| beyond which the presence of Multicollinearity can be suspected. Findings in Table 4.2 shows that almost all pairs of the relationships were below the threshold value except the association of credit to private sectors on exchange rate implying that there was Multicollinearity. The presence of Multicollinearity leads to the spurious estimates.

Table 4. 2: Correlation result

	Credit to private sector	Public debt	Exchange rate	inflation	Lending rate
Credit to private sector	1.0000				
Public debt	0.0571	1.0000			
Exchange rate	0.8686*	0.0799	1.0000		
Inflation	-0.3734*	0.0639	-0.2437	1.0000	
Lending interest rate	0.0653	0.4260*	0.2768	0.2503	1.0000

The results of table 4.2 indicate a weak positive correlation between majority pairs of variables evidenced by correlation coefficients of less than 0.5. A strong positive correlation between exchange rate and credit to public sectors. Moreover, the results show weak negative correlation

in the case of inflation and credit to private sector (-0.3734) as well as between exchange rate and inflation (-0.2437) respectively.

4.4. Diagnostic Tests

4.4.1. Multicollinearity test

Since the correlation matrix shows us which variables to retain or to drop due to collinearity, we conducted VIF test after pre-estimation tests to establish the specific variables which led to high collinearity among the pairs of credit to private sectors and independent variables. The VIF results is as shown below. Table 4.3 tabulate the results of the VIF.

Table 4. 3: Multicollinearity test using the Variance Inflation Factor

Variable	VIF	1/VIF
Lending interest rate	1.49	0.672855
Public debt	1.23	0.813211
Exchange rate	1.23	0.815505
Inflation	1.21	0.827455
Mean VIF	1.29	

From the result in Table 4.3, multicollinearity was not a serious problem in our data set since the VIF were less than the threshold 10 (Senaviratna & Cooray, 2019).

4.4.2 Normality test

To ascertain whether or not the data included in this investigation had a normal distribution, the current study employed the Shapiro-Wilk test for normality. The assumption that residuals follow a normal distribution is known as the null hypothesis. Table 4.4 tabulate the results of the normality test.

Table 4. 4 Normality Test

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
Res	50	0.87943	5.670	3.701	0.00011

From table 4.4 the probability value is 0.0011. This value is significance ($p < 0.050$) revealing that our variables are non-normally distributed. Thus, the residual was not normally distributed. However, according to Dave Giles (2013) the assumption of normality is not a requirement for ARDL model. Therefore, the residues failing to satisfy the assumption of normality will not affect our analysed results.

4.4.3 Autocorrelation test

The word "autocorrelation" refers to the relationship between successive periods of time in which the random error terms have occurred is what is meant when we talk about autocorrelation. The study used Breusch-Godfrey test for autocorrelation.

Table 4.5 Breusch-Godfrey LM test for autocorrelation

Lags(p)	Chi2	df	Prob>chi2
1	24.773	1	0.0000

Table 4.5 indicates a probability value is significance ($p < 0.0500$). Thus, autocorrelation was not a serious problem in our data set. We therefore conclude that autocorrelation between the current and previous error term. However, according to Andrew Q. Philip (2017) the lagged-difference structure purges autocorrelation and ensures that the residuals are white noise. The assumption of autocorrelation is not a requirement for ARDL model. Therefore, the residues failing to satisfy the assumption of autocorrelation will not affect the regression results.

4.4.3. Unit root test

This test confirms whether variables integrated are of the same order. To illustrate this, the study adopted the ADF test.

Table 4. 6 Unit Root Test

Variables	At level with intercept t-statistics	At first difference with t statistics	Order of integration
Credit to private sectors	0.7252 (-1.074)	0.0000 (-7.200)	I (1)
Public debt	0.0147 (-3.304)	-	I (0)
Exchange rate	0.9667 (0.109)	0.0000 (-6.358)	I (1)
Inflation	0.0015 (-3.982)	-	I (0)
Lending interest rate	0.4871 (-1.593)	0.0000 (-6.767)	I (1)

From table 4.6, P values for lending to private sectors, currency exchange, and rate of interest on loans were all found to exceed 0.0500. This implies existence of a unit root. There are no longer steady values for the three variables, as a consequence. However, the p values of public debt and inflation were significant ($p < 0.05$). Therefore, for the two variables which were stationary at level we rejected the null hypothesis of unit root against stationarity. For this problem, we performed a further initial ADF Unit root test on the private sector, exchange rate, and loan interest rate in an attempt to discover a solution. This ensured the stability of these variables.

4.4.3. Test for Structural Break

The structural break occurs if a time series unexpectedly changes at a particular moment in time. This modification may involve changes in mean or another parameter of the process that generates the time series. Therefore, structural break allows us to evaluate when and if there are major data changes. In this study, we used the Zivot-Andrew to determine the existence of a structural break and hence indicating the time of the break. Notably, Zivot Andrews tests for the unit root and allows for the structural breaks. The results of the test are shown in table 4.7

Table 4. 7: Zivot-Andrew unit root test

Country	variable	level			1 st difference		
		T-statistic	Time break	Decision	T-statistic	Time break	Decision
Kenya	Credit to private	-3.932 (0)	2011	Unit root	-7.241 (0)	2008	Stationary
	Public debt	-3.698 (2)	1981	Unit root	-8.743 (1)	2009	Stationarity
	Exchange rate	-4.649 (0)	1993	Unit root	-7.064 (0)	2002	Stationary
	Inflation	-5.083 (0)	1995	Unit root	-8.316 (1)	1994	stationary
	Lending interest rate	-2.790 (0)	1999	Unit root	-9.106 (0)	1995	Stationary

Source: Author's computation

The results of table 4.7 shows that at level credit to private sector was non stationarity and the structural break occurred in 2011. After lagging the credit to private sector became stationary with a structural break in 2008. Additionally public debt was stationary at first difference. There was a structural break in 1981 when it was at level and a structural break in 2009 after the first difference.

On the hand exchange rate at level was non stationary and with structural break in 1993 while after the first difference it became stationary with a break in 2002. We found that inflation was stationary at level with a structural break in 1995. Finally lending interest was not stationary at level with a structural break in 1999 but stationary after the first difference with a structural break in 1995.

4.5 ARDL Analysis

The ARDL model is used when researcher wants to know whether the predictor and predicted variables have both short- and long-term impacts and linkages. The model may provide short- and long-term elasticity for small sizes while co-integrating the variables using the ordinary least square (OLS) approach. Additionally, it is appropriate for modelling independent variables that are I (0), I (1), or jointly co-integrated. Nevertheless, it fails if I (2) is present in any variable. (Pesaran et al., 1996b). The ARDL Analysis involve the following steps; determination of optimal lag. Re-running the model with optimal lags, checking for the long run relationship. To perform this, we use the Pesaran bound test. Finally with the results of the bound test, we can check the relationship using the F and T statistic. The steps are demonstrated below.

4.5.1 Lag Selection Criteria

Before applying the bound test for checking co-integration that exist or not among credit to private sectors, public debt, exchange rate, inflation and lending interest rates, critically, its vital to select a suitable lag order. The study employed the VAR model in the selection of the appropriate lags. Tables 4.8, 4.9, 4.10, 4.11 and 4.12 indicate the lag selection criteria for employing the autoregressive distributed lag bound tests. Notably, AIC values are considered because it penalizes less for free parameters and has small values.

Table 4. 8 Private Credit Optimal Lag

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	-144.29				36.96	6.448	6.432	6.487
1	-101.05	92.492*	10	.000	5.169*	4.480*	4.510*	4.559*
2	-101.05	.0107	10	.918	5.398	4.524	4.568	4.643
3	-100.64	.7854	10	.375	5.544	4.550	4.610	4.709
4	-100.53	.2551	10	.614	5.761	4.588	4.663	4.787

From Table 4.8, the result shows that optimal lag is 1 as all the criteria confirm lag 1.

Table 4. 9 Public Debt Optimal Lag

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	-107.19				6.642	4.704	4.719	4.743
1	-96.41	21.56	10	.000	4.224	4.279	4.308	4.358*
2	-96.33	.1539	10	.695	4.398	4.319	4.363	4.438
3	96.94	6.777*	10	.009	3.965*	4.215*	4.274*	4.374
4	92.88	.1159	10	.734	4.133	4.256	4.331	4.455

For public debt, result in Table 4.9 reveals that the Akaike Information Criterion chooses lag 3.

Table 4. 10 Exchange Rate Optimal Lag

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	-227.22				1193.79	9.923	9.938	9.963
1	-138.90	21.56*	10		26.794*	6.126*	6.156*	6.205*- 1
2	-138.82	.1539	10		27.89	6.126	6.216	6.285
3	-138.75	.1398	10		29.05	6.166	6.265	6.367
4	-138.72	.0519	10		30.32	6.206	6.323	6.448

From Table 4.10 the optimal lag, according to the all criteria used is 1.

Table 4. 11 Inflation Optimal Lag

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	-161.19				67.64	7.052	7.067	7.092
1	-154.56	13.27*	10	.000	52.94*	6.807*	6.837*	6.887*
2	-154.34	.4413	10	.506	54.77	6.841	6.886	6.960
3	-153.62	1.450	10	.228	55.45	6.853	6.912	7.012
4	-152.85	1.538	10	.215	56.03	6.864	6.937	7.062

Table 4.11 shows that the optimal lag is 1 based on all criteria.

Table 4. 12 Lending Interest Rate Optimal Lag

Lag	LL	LR	Df	p	FPE	AIC	HQIC	SBIC
0	-150.88	43.17				6.603	6.618	6.642
1	-111.07	79.586	10	0.000	7.996	4.9162	4.946	4.996
2	-111.02	.1071	10	.774	8.328	4.957	5.002	5.077
3	-109.99	2.048	10	.152	8.322	4.956	5.016	5.115
4	-109.59	.8009	10	.371	8.545	4.982	5.057	5.181

From the result in Table 4.12, Akaike Information Criterion suggest that the optimal lag for lending interest rate is 1 also.

4.5.2 Short Run Results with Optimal Lags

We analysed the short run as per the ARDL model in Table 4.13

Table 4. 13: Short Run Results

Private Credit	Coefficient	Std. Err.	t	P>t	[95% Interval]	Confidence
Private Credit						
L1.	.8307974	.1249859	6.65	0.000	.5770626	1.084532
Public Debt						
--.	.0999037	.181482	0.55	0.585	-.2685243	.4683318
L1.	-.0448971	.2079148	-0.22	0.830	-.4669865	.3771924
L2.	.0808509	.2219212	0.36	0.718	-.3696731	.5313748
L3.	-.1050483	.1785004	-0.59	0.560	-.4674233	.2573267
Exchange Rate						
--.	.03809	.0837854	0.45	0.652	-.1320035	.2081835
L1.	-.012219	.0803937	-0.15	0.880	-.1754269	.1509888
Inflation						
--.	.0330978	.067651	0.49	0.628	-.1042409	.1704366
L1.	.0452917	.0527727	0.86	0.397	-.0618427	.1524261
Lending Interest Rate						
--.	-.481364	.1724354	-2.79	0.008	-.8314265	-.1313016
L1.	.4676351	.167087	2.80	0.008	.1284305	.8068396
Constant	1.998329	3.294844	0.61	0.548	-4.690559	8.687218

From Table 4.13 reveals that a one percent increase in current public debt leads to about 0.999037 increase in private sector credit under Ceteris Peribus. At lag one, two and three of public debt increases by 1%, private debt decreases by 0.0448971%, and increases by 0.0808509 percent and decreases by 0.1050483 percent respectively. Current public debt and its lag variables were insignificant. When current exchange rate and one lag exchange rate increases by a unit while keeping all other factors constant, private sector credit increases by 0.03809 units and decreases by 0.012219 units respectively. The current and one lag exchange rate was insignificant. On the same note, a 1% increase in both one lag inflation and current inflation, we found that private credit increases by 0.452917% and 0.0330978% respectively. In addition to this, the current lending interest rate and its lag when increased by one unit, private credit decreases by 0.481364 units and increases by 0.4676351 units respectively. Given that their respective p-values are less

than 0.05, they are therefore said to be statistically significant. When all other variables equal to zero, private credit equals to 1.998329 units. Hold all other factors constant, when lag one private credit increases by 1%, current private credit increases by 0.8307974%. Since the p-value for lag one private credit is less than 0.05, it is likewise considered to be statistically significant.

4.5.3 Long Run Results with Optimal Lags

To determine whether there exist long run effect of public debt, exchange rate, inflation and lending interest rate, Pesaran Bounds Test was undertaken and the findings were presented as in Tables 14

Table 4. 14: Critical Values (0.1-0.01), F-statistic and t statistics

	Calculated test statistics F = 1.246 t = -1.354							
	Estimated critical values							
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
F	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06
T	-2.57	-3.66	-2.86	-3.99	-3.13	-4.26	-3.43	-4.60

H0: no levels relationship

When using a significance threshold of 5%, Table 4.14 demonstrates that the F statistic (1.246) is lower than the lower limit (2.86), and it is not larger than the upper bound (4.02), indicating that there is no long-term association between the variables. This conclusion is supported by the fact that the F statistic is not larger than the upper bound (4.02). The findings of the t-statistics that are shown in Table 4.14 provide additional evidence that there is no connection between the variables when viewed over a prolonged period of time.

4.6 Post estimation test

4.6.1 Heteroscedasticity test

Heteroscedasticity is required in order to determine whether or not there is fluctuation of the error terms across observations or whether or not there is a lack of consistent variance caused by the research variables. HO: constant variance. The Breusch-Pagan test was carried out in order to examine the Heteroscedasticity of the data. Table 4.15 tabulate the outcome of the Breusch- pagan test.

Table 4. 15: Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity

chi2(1)	0.57
Prob > chi2	0.4514

We fail to reject the null hypothesis of constant variance since the probability value of chi-squared is greater than 5%, or 0.4514. As a result, we deduced that the model was not heteroskedastic.

From the result of the diagnostic test above, we conclude that the result is robust and the interpretation and inferences made up from the result will not mislead.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The section gives a summary of the results presented in chapter four, from these; it makes the conclusion and finalizes by highlighting possible policy implications and recommendations.

5.2. Summaries of the findings

The analysis of the association between the level of public debt and the quantity of credit that is made accessible to the private sector was the major purpose of the study. In doing so, it relied on and tested the quantity channel by putting less stress on the function of interest rate in determining the transmission of public debt shock to the private sector. This was accomplished by placing less emphasis on the role of interest rate in determining the transmission. In order to achieve this goal, we decided to place less of a focus on the significance of the connection that exists between the two. Therefore, the interest rate was considered to be one of the control variables throughout the process of ARDL estimation.

It was found that Kenya's public debt does not have a statistically significant effect on the country's capacity to lend money to the private sector over the long term. This was one of the discoveries that was made. Our test for cointegration did not uncover any indication of a cointegrating relationship between public debt and private sector credit, or between any of the other control variables for that matter, which is not surprising given the results of the test. As a consequence of this, we determined, using a short-run ARDL, that the level of public debt had no influence on the amount of credit made available to the private sector.

5.3. Conclusions

Since it was shown that governmental debt does not have an influence on private sector lending, and since we were led by the three potential outcomes of the quantity channel hypothesis, we came to the conclusion that there may be an excess of liquidity in Kenya's banking system. Quantity channel of public debt effect on private credit give three possibilities one which is no effect in case of excess liquidity. The claim is that such level of liquidity means enough credit able to satisfy both the demand of a government and the private sector.

5.4. Policy Implications

According to the findings of this study, which showed that the private sector credit was unaffected, the government can continue to borrow in order to reap the benefits of borrowing, such as achieving and maintaining full employment, achieving high economic growth, and maintaining wage and price stability.

5.5 Recommendation for further studies.

It is important that future research investigate the connection between public sector borrowing and private sector loans in more depth using data from East Africa.

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