

**SELECTED MACROECONOMIC VARIABLES AND PRIVATE  
SECTOR INVESTMENT IN KENYA: AN EMPIRICAL ANALYSIS**

**BY  
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## DECLARATION

I the Undersigned, hereby declare that this Research Project is my original work, and it has never been submitted to another University or Institution other than the University of Nairobi for examination.

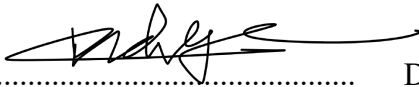


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## **DEDICATION**

Special gratitude to my parents for being my strongest source of support. To you, I dedicate this project.

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## **LIST OF ACRONMYS AND ABBREVIATIONS**

ARDL – Autoregressive Distributive Lag

ANOVA - Analysis of Variance

CUMUS – Cumulative Sum Square Test

EMC – Error Correction Model

FDI – Foreign Direct Investment

FH - Feldstein-Horioka

GDP – Gross Domestic Product

IMF – International Monetary Fund

LCD - Least Developed Countries

MEI – Marginal Efficiency of Investment

OLS – Ordinary Least Square

SAP – Structural Adjustment Program

SSA – sub-Saharan Africa

SSR – Sum of Squares

VAR – Vector Autoregression



## ABSTRACT

For developing economies, structural reforms aimed at improving financial intermediation and private investment were prescribed as necessary preconditions for growth and development. In Kenya, massive reforms to enhance private capital formation have been gradually rollout since the 1980s. Savings mobilization and credit access have improved but are not at desired levels. Public borrowing to finance fiscal deficits and investment on social and development projects have both aided and restricted private investment. Despite being one of the fastest growing sub-Saharan African economies, private investment in Kenya is below projected levels. The study adopts a Descriptive Research Design, using correlation and multivariate regression estimation techniques to observe and explain the relationship between domestic savings, lending interest rate, public debt, Real GDP, and private investment in Kenya. Using domestic savings and cost of commercial credit as proxy variables for financial intermediation, the study finds the relationship between private investment, domestic savings, and lending interest rates to be significant and positive, a confirmation of *financial liberalization* hypothesis. The study empirical assessment of public debt and private investment estimates an inverse linear relationship, consistent with crowding out theory. Real GDP and private sector capital formation relationship was observed to be positive but statistically insignificant. The paper recommends that fiscal policy should be rationalized towards revenue expansion and external concessional borrowing. Public borrowing domestically should be minimized to expand private credit and crowd in private investment. Regarding financial intermediation, monetary policy should prioritize moderating inflation to low and stable levels. This would facilitate the realization of positive and stable real interest rates, which will be instrumental to the inducement of higher savings, expansion of private credit, and enhancement of private sector investment.

# CHAPTER ONE INTRODUCTION

## 1.1 Background of the Study

Investment has been acknowledged as an important component of economic development. Countries registering high economic growth have recorded investment of over 25 percent of GDP in the ten years preceding high growth (OECD, 2017). Low private investment in developing economies was considered a product of *financial repression* (McKinnon & Shaw, 1973). As a result, Structural Adjustment Programs (SAP) was prescribed as a panacea to developing economies' low capital formation and growth malaise. Developing countries initiated and aligned structural reforms with the tenets of the McKinnon and Shaw 1973 model, in order to mobilize increased domestic savings, improve access to affordable credit, deliver enhanced private sector investment and growth (Orji, Ogbuabor, & Anthony-Orji, 2015). In Kenya, private investment remains largely underwhelming partly due to the crowding out effects of growing public debt (Mutuku, and Kinyanjui, 2018). Delivering high levels of private investment rely on key macroeconomic predictors. According to Keynes, 1936 Savings-Investment Equality Model, investment is dependent on domestic savings, which is sensitive to changes in aggregate income. Consistent with Keynes' model, Samuelson 1939 theorized that investment outlays are contingent on, and responsive to business cyclicality; while Jorgenson, 1963 investment hypothesis states that investment decisions are influenced by the cost of capital, which dictates expected returns and investment expenditure. In several developing economies, empirical evidence point to GDP, interest rates, inflation, exchange rates, public investment, and private sector credit as primary factors that assert varying degrees of influence on private capital formation (William, et.al, 2015; Ayeni, 2014; Mndeme, 2015; Anwanyu, 2013; Frimpong & Marbuah, 2010, and Mbaye, 2012).

### 1.1.1 Selected Macroeconomic Variables

The term macroeconomics describe economic aggregates such as GDP, inflation, interest rates, national income, exchange rate etc. that influence the general wellbeing of an economy (Romer, 2012). Generally, the concept of macroeconomics deals with the overall structure, behavior, and performance of an economy. Priority will be placed on the selected macroeconomic variables of interest to this research project. This paper will endeavor to

explore the influences domestic savings, lending interest rate, real GDP, and public debt have on private sector investment in Kenya.

For developing economies to deliver enhanced capital formation in the private sector, financial liberalization theorists, McKinnon and Shaw, 1973 posited that structural reforms would be required to improve the performance of macroeconomic factors such as national savings, and domestic credit. This assertion set structural reform as a precondition and catalyst for improved national savings and domestic credit if meaningful advancements in private investment and growth are to be realized. Empirical assessment by Fowowe, 2009 in sub-Saharan African (SSA) confirmed that reform delivered improved capital formation and stimulated economic growth. Another study by Akinsola and Odhiambo, 2017 in SSA observed a strong positive dynamic between domestic credit, private capital formation and growth. However, the study went further to state that empirical evidence from various studies highlight an inconsistent trend in the impact of liberalization across SSA.

Keynes, 1936 theory on investment claimed that macroeconomic factors such as domestic savings and aggregate income were critical predictors of capital formation. Empirical study by David, et al, 2020 corroborates Keynes postulation, confirming that the macroeconomic performance of domestic savings dictate the level of investment attainable in developing economies. Salmani, et.al, 2016 found that domestic savings positively influences investment in emerging countries, albeit not significantly, compared to industrialized economies. Samuelson, 1939 theory further identified that variations in macroeconomic aggregates such as gross domestic product or gross national income predominantly accounted for aggregate expenditure on capital assets in an economy. In most economies, overwhelming empirical evidence confirm that changes in the macroeconomic performance of gross domestic product, GDP per capita, real GDP, etc. critically determine capital expenditure on productive assets. In Asia and sub-Saharan Africa, Ghura & Goodwin, 2000 study found that real GDP growth was a major driver of capital formation in the private sector. Real GDP, according to Ayeni, 2014 study in Nigeria has a strong positive influence on capital formation. In Kenya, real GDP, interest rate, and exchange rate significantly determine capital accumulation in the private sector (Mbaye, 2012).

Jorgenson, 1939 theory on investment stressed that the economic incentive for investment is determined by the cost of capital proportionality to expected returns. In line with Jorgenson

investment theory, Erden and Holcombe, 2005 study confirms that the lending conditions in developing economies placed serious limitations on private investment and growth. Domestic credit in Tanzania and Kenya is proven to be positively associated with aggregate expenditure on capital assets and economic growth (Muyambiri and Magali, 2020). Keynes and classical economists' proposition on the function of public debt in enhancing private investment and stimulating growth is polarizing. Classicalists frowned on excessive public spending, claiming it was inefficient and crowded out private investment. Keynes contended that public debt used to finance government activities crowded in private investment and augmented growth. Empirical studies have documented both effects on private investment in developing and advanced economies. Mutunga, 2020 study reported a crowding out effect in Kenya. Because government debt is below onerous levels, capital formation in Tanzania has been crowded in by public debt and investment (Salyungu & Felician, 2019). A much broader assessment by Erden and Holcombe, 2005 in developing economies observed the linearity between capital formation and fiscal spending to be strong and positive, but a crowding out effect was recorded in advanced economies.

### **1.1.2 Private Sector Investment in developing economies**

Private sector investment refers to expenditure on capital assets used as conciliators in the production of final goods/services. It represents net changes in outlays on capital assets by private sector firms (Bakare, 2011).

A United Nations report in 2014 suggested that African economies need to mobilize an investment portfolio constituting 25 percent of GDP to deliver sustained growth and development. Private investment in developing countries experienced a marked decline from 26.5 percent of GDP in 1981, to less than 23.5 percent between 1985-1988. This decline occasioned the widespread adoption of Structural Adjustment Programs (SAP), slow growth in real GDP (averaged 3.3 percent between 1981-89) and a precipitous fall in GDP per capita from 3 percent between 1971-89 to less than 1 percent between 1981-89 (Green & Villanueva, 1991). Research findings by Khan and Reinhard, 1990 and financial liberalization propositions by McKinnon and Shaw, 1973 called for a shift from massive public investment to greater reliance on private sector investment to deliver sustained economic growth in developing economies.

Investment performance in emerging economies is assessed to be highly sensitive to changes in domestic savings, while it is less significant to capital formation in advanced economies (David, A. C., et. al, 2020). Meanwhile, domestic credit in Kenya and Tanzania is a critical determinant of investment and growth (Muyambiri, & Magali, 2020). According to Erden and Holcombe, 2005 public spending accelerates private capital formation in emerging economies but crowds out investment in advanced economies. For developing economies, external public debt exceeding 60 percent of GDP tends to subdue economic performance (Reinhart and Rogoff, 2010). Whereas in developing economies across Asia and sub-Saharan Africa, real GDP growth, public investment and financial intermediation are macroeconomic factors that strongly predict private investment performance (Ghura & Goodwin, 2000).

The business climate, policy environment and quality of public service strongly influence both the level and quality of private sector investment in developing countries (Everhart & Sumlinski 2001). Overall, private investment remains challenged in developing countries. Insufficient credit, macroeconomic uncertainties, limited public investment, and inadequate policy environment are key restraining factors (Bayraktar, 2003).

### **1.1.3 Selected Macroeconomic Variables and Private Sector Investment**

Public debt refers to aggregate domestic and external debt owed by a government (Patenio and Tan-Cruz, 2007). Public debt is often used to finance fiscal deficits and government capital projects. The opposing viewpoints of classical economists and Keynes on public debt lend explanation to the crowding in and crowding out effects. Classical economists are proponents of government *laissez-faire* approach, claiming that massive public spending, which was largely characterized by inefficiency distorted credit markets by diverting capital away from private sector investment. In 1936, Keynes offered a counterargument, citing that increased public spending financed by debt was necessary to address market imperfections during recession. He further reasoned that public borrowing and investment are necessary precursors for enhanced private investment and aggregate output.

Public debt is essential but at various levels, the implications on economic performance in both emerging and advanced economies can vary, according to Reinhart and Rogoff, 2010. Public spending, according to a study undertaken in developing economies, crowds in private investment. It is estimated that a ten percent increase in government spending occasions a two

percent rise in private investment (Erden and Holcombe, 2005). While in Kenya, both crowding in and crowding out effects has been observed.

Since the turn of the millennium, Kenya's public debt has fluctuated but generally maintained an upward trend – rising from 62.6 percent in 2001 to 69.3 percent of GDP in 2020. According Mutuku & Kinyanjui, 2018 increased national debt, particularly debt financed domestically, has limited private access to domestic credit and restrained private investment in Kenya. Mutunga, 2020, indicated that Kenya's rising costs of servicing public debt has restrained private investment and growth. Elsewhere in neighboring Tanzania, public debt has crowded in private capital formation (Salyungu & Felician, 2019). Oshieng, 2018 stated that Kenya public debt exceeded recommended limits, raising concerns about its debt sustainability as growth trends in public debt and economic growth are asymmetrical. IMF, 2021 rates Kenya's risk of debt distress high, but also considers its debt burden manageable as the government commits to fiscal consolidation measures. However, Njuru, et al., 2014 recorded a positive impact of public investment on private investment in Kenya, citing a parallel connection between increased fiscal expenditure and private investment.

Domestic savings is a critical growth variable because it facilitates investment by supplying capital to both public and private sectors (Adewuyi & Arawomo, 2007). Domestic savings in emerging economies does have a direct effect on capital formation and is pivotal to long-term growth (David. et al. 2020). Keynes, 1936 theorized that savings is a function of income; *ceteris paribus*, low income carries the tendency of producing low savings. Consistent with Keynes' view, savings in Africa is inherently low. It is argued that compared to other continents, Africa's low-income status is responsible for its low savings mobilization (Kibet et. al, 2009). Arok, 2014 study suggests that domestic savings mobilization in Kenya is contingent on real per capital income. However, Kenya's domestic savings performance remains unimpressive (Kahangi & Muturi, 2013). This underwhelming savings performance comes off the back of four decades of massive structural reforms (Ndirangu & Muturi, 2015).

Kenya long-term economic plan targets a domestic savings to GDP ratio of 30 percent and total investment contribution of 32 percent by 2030. By 2017, a decade since *Vision 2030* adoption, private sector investment has been underwhelming (Mutuku, and Kinyanjui, 2018). Between 2008-2018, domestic savings experienced a net declined of 0.45 percent and averaged 7.04 percent of GDP (World Bank Data, 2008-2018). Gonçalves, et. al., 2020 surmised that low

domestic savings are likely to constrain investment even if an economy is open to international capital flows. Hence, policies that promote domestic savings to stimulate investment should be prioritized.

According to Loanable Fund Theory, the supply of credit (savings) and demand for credit (borrowing) in an economy determine the price of credit (Saunders, 2010). Research conducted in low and middle-income African economies reveal that private sector lending weighs heavily on capital formation (Oshikayo, 1994). Erden and Holcombe, 2005 study also asserts that bank lending constrains private capital formation in developing countries. Credit access is affected by the risk characteristics of borrowers, which significantly informs the price of credit. Therefore, interest rates play an important role in financial intermediation as it enables capital flow from savings to investment, which facilitates growth (Rose, 1989).

Lending rate in Kenya is dictated by public borrowing and inflation, which affect domestic credit and capital formation (Itimu & Abdul, 2018). Prior to liberalization, lending rates were low, stable, and generally demonstrated a predictable pattern in Kenya (Ngugi, 2001). Growth and per capital income were impressive, as savings and investment performances mirrored growth patterns (Rono, 2002). Low and positive real interest rates were the goal of monetary policy, which aimed to reduce inflationary pressures and support investment and growth (Ngugi & Kaburo, 1998). Between 1971-1979, lending rates fluctuating between 9 to 10 percent and averaged 9.61 percent, as gross investment averaged 21.08 percent of GDP (World Bank, 1971-1979). During this period, Kenya recorded its highest growth of 22.2 percent in 1971 (Rono, 2002).

Post-financial liberalization has largely been accompanied by a sustained increase in lending rate in Kenya (Itimu and Abdul, 2018). Lending rates soared drastically between 1980 and 2000, averaging 20.67 percent, after which it modestly fluctuated but generally decreased to 12.44 percent by 2019. During the same period, gross investment as a proportion of GDP, and economic growth averaged 14.12 and 3.97 percent respectively (World Bank Data, 1980-2019). Changes in lending rates and economic performance in Kenya have been affected by the balance of payment and global oil crisis of the early 1970s; the foreign exchange crisis of the early 1980s; macroeconomic shocks caused by financial liberalization in the 1990s, amongst other factors (Nguigi and Kabubo, 1998).

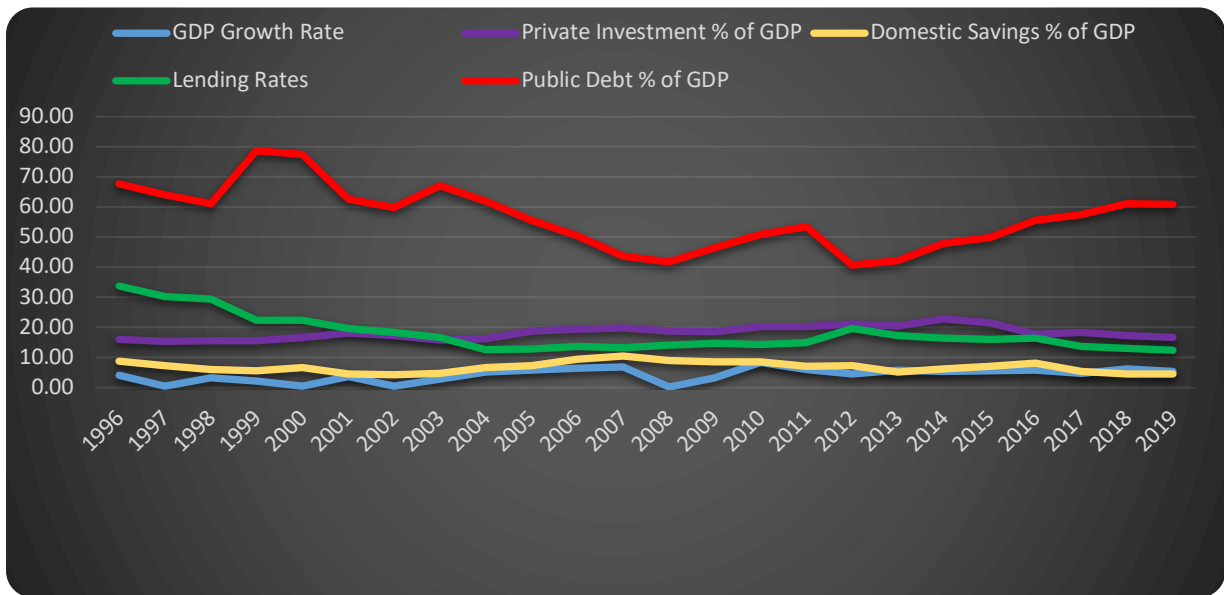
#### **1.1.4 Private Sector Investment in Kenya**

In Kenya, private sector provides about 80 percent of employment, lends significant support to the fiscal envelop, and accounts for approximately half of GDP (Mutunga, 2020). Kenya *Vision 2030* identifies investment as a major catalyst for sustained economic growth. The vision is anchored to a total investment portfolio of 32 percent of GDP, domestic savings constituting 30 percent of GDP, improved access to affordable credit, amongst others. For much of its first decade of independence, Kenya enjoyed rapid economic growth and enhanced investment, reaching highs of 22.4 percent growth rate and 22.1 percent of gross fixed capital formation as a percentage of GDP in 1971 and 1978, respectively (World Bank, 1971-1978). GDP grew by 6.6% as savings and investment were relatively high given Kenya's income per capita (Rono, 2002). Gross investment which averaged 15.86 percent of GDP between 1964 and 1979 was mostly healthy as it experienced a net increase over the period. Investment steadily increased for much of this period with very little occasional contractions (World Bank, 1964-1979).

During its *golden decade*, Kenya's economic performance was markedly influenced by 44 percent value addition in manufacturing and agriculture, macroeconomic stability, and its import substitution policy. Additionally, low inflation coupled with low, stable, and predictable interest rates increased capital accumulation and economic output. Following strong economic performance, the adoption of liberalization reform policies in the 1980s had an immediate adverse impact on private sector investment and growth (Gertz, 2010). Between 1980 and 1999, private sector investment averaged 9.20 percent of GDP, recording its highest performance of 16.01 percent of GDP in 1996 and lowest of 7.10 percent of GDP in 1982 and 1985, during this period (World Bank, Statistical Abstracts & various issues). In terms of economic performance, growth averaged 7 percent in the 1970s, 4.2 percent in the 1980s and 2.2 percent during the 1990s (Gertz, 2010). At the turn of the millennium, growth and investment expectations were anchored to a five-year Economic Recovery Strategy for Wealth and Employment Strategy policy. Since, growth and investment have averaged 4.67 percent and 16.52 percent of GDP, respectively (World Bank, 2000-2018). Weak macroeconomic environment and financial sector constraints have been blamed for the slow growth and investment performances (Njuru, et. al., 2014).



**Figure 1.1: Trends in Selected Macroeconomic Variables (1996-2019)**



Source: World Bank, Central Bank of Kenya, National Treasury of Kenya, Statistical Abstracts various issues

## 1.2 Research Problem

There is consensus amongst international development agencies, the likes of World Bank, IMF, etc., and economists, such as McKinnon and Shaw that adherence to structural reforms will increase private investment and deliver growth in emerging economies. In furtherance of this proposition, financial intermediation was mooted to offer efficiency in mobilising domestic savings, and credit to support private investment (McKinnon & Shaw, 1973). Evidence of the efficacy and dividends of structural reforms in sub-Saharan Africa remain polarizing and inconclusive (Akinsola & Odhiambo, 2017; and Fuwowe, 2009). Contrary to classical economists' viewpoint, Keynes theory that public borrowing and investment are necessary for private investment is now a prominent contemporary phenomenon. Public debt is now on the rise globally. Empirical evidence support Keynes' value proposition but have gone further to identify public debt ceilings, above which growth and private investment will be restrained (Reinhart & Rogoff, 2010).

Kenya's vision 2030 economic objectives are almost certainly aligned with the tenets of liberalization and financial intermediation – greater private investment (32%), improved domestic savings (30% of GDP) and high economic growth (10%). Kenya's *golden decade* of strong economic performance is about four decades ago. The 1980s and 1990s growth performances were marred by shocks from liberalization, financial crisis and macroeconomic

uncertainties. The turn of the millennium has seen erratic spells of low and modest growth performances. Since its *Vision 2030* adoption, economic performance is healthy but far below its envisioned target of 10% annual growth rate (growth has averaged 5.1% between 2008-2018).

Kenya *Vision 2030* predicated growth projections upon increased private sector investment which remains lethargic as growing public debt has crowded out private investment (Mutuku & Kinyanjui, 2018). About 50 percent of domestic public debt is held by commercial banks, an apparent reason for public debt crowding out effects (IMF, 2021). Public debt continues to surge to unsustainable levels with a high risk of debt distress (Ochieng, 2018 & IMF, 2021). However, Njuru, et. al, 2014 study documented a strong positive linearity between fiscal spending on private investment. Domestic savings has largely been low (Kahangi & Muturi, 2013). Economy-wide reforms and technology-driven innovation have improved access to financial services, but financial intermediation is far from optimal. Lending rates have oscillated but maintained an upward trend since liberalization. The margin between interest on deposits and lending rates is high compared to South Africa, Malaysia, and Mauritius (Itimu & Abdul, 2018). Legislative efforts to reverse this trend via interest rate capping in 2016 failed; hence it was repealed in 2019.

The performance trends observed in the referenced macroeconomic variables demand investigation. Do changes in growth, public debt levels, domestic savings and cost of borrowing have a substantial influence on the behavior of private capital formation in Kenya?

### **1.3 Research Objectives**

The general objective will be to examine and describe the extent of the connection between the explanatory macroeconomic variables and private sector investment in Kenya.

#### **1.3.1 Specific Objectives**

Specifically, the research will seek to observe and describe:

- i. The relationship between public debt and private investment in Kenya
- ii. The relationship between domestic savings and private investment in Kenya
- iii. The relationship between lending rates and private investment in Kenya
- iv. The relationship between real GDP and private investment in Kenya

#### **1.4 Value of the Study**

Assessment reports on the First and Second Medium-Term Plans for Kenya's vision 2030 uncover performance gaps in key indicators – inadequate growth, low savings and investment, high cost of acquiring bank financing, amongst others. Public concern looms given the trends observed in key indicators. Several studies have identified the critical predictors of private investment. Others have explored the role of domestic savings and credit to private investment and growth. This study will employ a descriptive research approach, using correlation and multivariant regression analyses to understand if the trends in public debt, real GDP, domestic savings, and cost of bank credit have significant bearing on private investment in Kenya.

The results of this study will be valuable to those in charge of Kenya's Vision 2030, as well as those overseeing fiscal, monetary, and investment policies. Furthermore, it will add value to the current body of academic literature by serving as a reference for future empirical investigations into the role of domestic savings, growth, lending interest rates and public debt on private investment.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter covers a review of the relevant concepts that explain the relationship between selected explanatory variables and private investment. The areas covered include the theories that underpin the research, discussion on the economic predictors of private sector investment and a review of empirical studies. Further, a section on the conceptual framework is covered and the section ends with a summary of literature review.

#### 2.2 Theoretical Literature

##### 2.2.1 Financial Liberalization Theory

Postulated by McKinnon and Shaw in 1973, the theory reasons that the financial systems and economic structures employed in *repressed economies* constrained domestic savings, credit provision and private investment, which inhibited long term economic growth. Repressed economies, typically undeveloped and developing economies are often characterized by uncompetitive and inefficient methods of controls on key macroeconomic factors. Financial repression constituted administrative restrictions on interest rate, capital requirements and lending conditions; imposition of trade barriers through quotas and tariffs; restrictions on foreign exchange rates and transactions; excessive fiscal and monetary controls, etc. Economic management under these controls were deemed counterproductive to savings, investment, and growth. Liberalization theory prescribed structural adjustments and market-oriented reforms in developing countries to mobilize domestic savings, improve financial intermediation, increase private investment, and induce long term economic growth.

##### 2.2.2 Investment Theories

Keynes developed a modified version of the **Savings-Investment Equality** Theory in 1936, which explains that changes in aggregate income accounted for variations in savings and investment equality. He claimed that aggregate income equals consumption and savings; thus, savings, a residual of aggregate income after adjusting for consumption equates to investment expenditure. The direct practicality of this theory in contemporary economies is contentious given international capital flows, but its key tenet is that economic output determines the level of savings and capital formation attainable in an economy.

The **Marginal Efficiency of Investment (MEI)** theory was proposed by Keynes in 1936. He claimed that additional investment is made when the rate of return/MEI is equivalent to or exceeds the costs of capital associated with the marginal investment. MEI is a metric used in capital budgeting and investment decision-making. The principle of this hypothesis is that marginal investment is informed by its associated costs proportionality to expected returns.

The basic principle of the **Accelerator Theory of Investment** is that investment is responsive to business cyclicalities. Growth triggers increased investment as decline in economic output tend to contract capital investment. The model asserts that investment agents seek to maximize profit through productivity. Hence, firms only invest in capital assets when existing stock is inadequate to meet increased aggregate demand (Samuelson, 1939).

The **Neoclassical Theory of Investment** was developed as an alternative to the Accelerator Model by Jorgenson in 1963. The model claims that additional investment outlays intended to optimize capital stock to desired levels is determined by the proportionality of marginal returns to the marginal costs of said investment. The theory rationalizes that investment behavior is purely based on profit maximizing incentives; hence investment is based on costs-returns proportionality. Investment adjustment to meet desire levels is affected by interest rates, capital asset price, asset depreciation rate, etc.

### **2.2.3 Theory of Financial Intermediation**

Financial intermediation is the use of financial intermediaries (i.e. banking institutions) to overcome the inefficiencies associated with market imperfections. Absent financial intermediation, high transaction costs and information asymmetry will impose transaction barriers between savers and borrowers, thus restricting optimal exchange. Financial intermediation theory underscores the role of intermediaries – efficient mechanism that mobilizes capital and allocates credit to productive investment uses consistent with the risks and costs of advancing, monitoring, and recovering credit.

### **2.2.4 Crowding In and Crowding Out Effect Theories**

Government borrowing and spending behavior has far-reaching effects on growth and private investment. The crowding in effect theorizes that increases in government spending, especially during downturns, have a multiplier impact on private investment and aggregate output (Keynes, 1936). On the other hand, crowding out theory asserts that high levels of government

debt reduces the availability of domestic credit for private investment. According to this hypothesis, an increase in government spending financed by domestic credit competes with private investment for available loanable capital. Consequently, this raises the costs of borrowing and limits private access and use of domestic credit.

## **2.3 Macroeconomic determinants of Private Sector Investment**

### **2.3.1 Gross Domestic Product (GDP)**

The amount of aggregate income, expenditure, or output is used to estimate GDP, and in some estimations, a combination of all three parameters is used to measure GDP. Overwhelming empirical evidence corroborates Keynes, 1936 and Samuelson, 1939 postulations that investment is most responsive to business cyclicality. It is approximated that countries registering rapid growth have a proportion of capital formation to GDP of about 25 percent (OECD, 2017). Other studies have indicated that changes in nominal GDP, GDP per capita and or real GDP accounted significantly for the level of private capital formation attainable in various developing countries (Anwanyu, 2013; Frimpong & Marbuah, 2010; Mbaye, 2012; Mndeme, 2015; and Ghura & Goodwin, 2000).

### **2.3.2 Inflation**

Friedman, 1970 stated that inflation is a monetary phenomenon, as such changes in the general price level is determined by money supply which affects aggregate output. Inflation according to Fisher, 1911 regulates changes in real and nominal interest rates. As a result, it is generally inferred that high and unpredictable inflation raises the cost of borrowing, restricts private sector access to credit; ultimately, restraining private investment. Low and stable inflation on the other hand, lends a sense of certainty to investors and tends to improve financial intermediation which is plausible for private investment. Because inflation generally signals uncertainty, it tends to limit private capital formation in developing countries. High levels of inflation, according to empirical evidence, stifles private investment (Oshikoya, 1994). In Kenya, according to Mbaye, 2012 inflation is one of several macroeconomic variables whose relationship with private capital formation is negative but insignificant. In contrast to the findings referenced above, Frimpong and Marbuah, 2010 find that the association between inflation and private investment exhibits a positive consistency in the long and short run in Ghana.

### **2.3.3 Interest Rate**

Liberalization theorists, McKinnon and Shaw in 1973 contended that artificially low nominal interest rates in developing countries resulted in negative real interest rates because they were not anchored to free-market imperatives. Low interest rates matched by high inflation resulted in negative real interest rates, which effectively removed the incentives to save, restricted domestic credit, and constrained private investment. Because private investment is heavily reliant on financial intermediation, the terms of credit offered by intermediaries can either encourage or discourage private investment (Chakrabarti, 2017). In developing economies across Asia and sub-Saharan, the supply and cost of credit significantly determine private investment (Ghura & Goodwin, 2000). According to Ayenyi, 2014 real interest rate is key to private investment in Nigeria. While in Ghana, Frimpong and Marbuah, 2010 claim that interest rate is one of three important macroeconomic predictors of private capital formation.

### **2.3.4 Public Debt**

Globally, public debt continues to soar, hence, the nature and extent of its influence on private investment and growth continues to pique the interest of economists. Floating bonds and Treasury bills, as well as commercial and concessional loans are common sources of debt financing for governments. According to Reinhart and Rogoff, 2010 when public debt as a proportion of GDP exceeds 60 percent in developing economies the consequences on growth is adverse. For emerging economies, the IMF has proposed a public debt to GDP limit of 40 percent, above which the overall ramification on private investment and growth could be adverse (IMF, 2016). Empirical findings have documented the following effects of public debt on private capital formation: crowding in effect (Erden and Holcombe, 2005); crowding out (Mutunga, 2020); and debt overhang (El-Mahdy and Torayeh, 2009).

### **2.3.5 Domestic Savings**

According to Keynes' 1936 Savings-Investment Equality model, investment is strongly reliant on domestic savings, which is sensitive to fluctuations in aggregate income. In developing economies, David et al., 2020 study reveals that domestic savings significantly dictates capital accumulation. Similar findings in Nigeria by Naisuru and Usman, 2013 and Tanzania by Mndeme, 2013 suggest that savings has a positive long run association with investment. However, in advanced economies, the association between savings and capital formation is assessed to be positive but statistically insignificant (Behzed, et al., 2016). Previous studies by

Mühleisen, 1997 and Carroll and Weil, 1994 revealed that the level of domestic savings is determined by changes in economic growth. Because domestic savings is a substantial source of investment finance and changes in GDP dictate domestic savings mobilization, it would be plausible if developing economies ensured a high and stable GDP growth in order to support high levels of investment.

## **2.4 Empirical Review**

This section will cover empirical findings relevant to the study. Significant research effort has gone into investigating the factors that determine, stimulate, correlate with, or otherwise inhibit private capital formation and growth in developing countries. It is a popular area of research because private investment is critical to growth and development. Empirical studies have analyzed the macroeconomic variables and policy environment that affect private investment and growth. Research methods and findings have varied in the empirical assessments.

### **2.4.1 Macroeconomic Determinants of Private Sector Investment**

In Nigeria, Ayeni (2014) study shows that real interest rates, real GDP, inflation, and lending to the private sector are all key factors that influence private capital formation. Using time series data from 1979 to 2012, he applied the ARDL approach to examine the causal connection between selected macroeconomic factors and capital formation. With regards to policy, the research advises the Nigerian government to pursue investment-specific policies to encourage and promote private investment. To enhance private investment, fiscal expenditure on development-enhancing infrastructure should be prioritized. Another study by Anyanwu, 2013, indicates that growth in a country's real GDP enhances the effective demand on the aggregate level, which stimulates greater private investment in an economy. He further assessed that real GDP per capita relationship with Foreign Direct Investment (FDI) demonstrated a positive consistency. On the other hand, Nnadozie and Osili, 2014 study concurs with the above findings that changes in GDP determine private outlays on capital assets but finds the evidence on the impact of GDP per capita on private investment to be minor.

Inflation, interest rates, and external government borrowing all have a major impact on private capital formation in Ghana, according to Frimpong and Marbuah, 2010. The study assessed that changes in GDP affect private sector capital formation in the long run, but its short run



effect is minor. It approximates that a one percent increase in aggregate output will elicit an increase in private capital formation by over forty percent. This finding is supported by Acosta and Loza's (2005) findings for Argentina, as well as Bende-Nabende and Slater's (2005) cross-country study of Indonesia, Malaysia, and Thailand.

Mbaye, 2012 used data from 1970 to 2010 to examine the factors that determine private sector investment in Kenya. The Engle-Granger test and ECM estimates revealed that real GDP, real exchange rate, broad money and positive real interest had long run positive implications on private investment, while the influence of variables such as public investment, private sector credit, inflation, political regime, amongst others were observed to be negative but minor.

#### **2.4.2 Structural reform and Financial Intermediation**

Fowowe, 2009 study attempted to evaluate the efficacy of structural reforms in 19 economies in Sub-Saharan Africa. He developed indexes as proxies for measuring the magnitude and scope of structural reforms in order to assess its impact on private capital formation. The study divided countries into two groups – slow and rapid growth economies. Regardless of the categorisation, both fast and slow growing economies registered positive correlations with proxy estimators of liberalization. The study's findings infer that financial liberalization, which translated into improved financial sector capacity (savings mobilization and credit provision), boosted private capital formation and growth in the selected economies.

Nguigi and Kabubo, 1998 analysis of Liberalization in Kenya reckons that reform adoption is still a work in progress. The paper argues that in the short run, Kenya's adoption of Structural Adjustment Programs led to macroeconomic shocks which adversely impacted economic performance. As far as liberalization delivering efficiency in terms of financial intermediation, this is yet to be fully achieved. Since liberalization's adoption in the early 1980s, positive real interest rate was not realized until 1996. Prospects of maintaining positive real interest remain less optimistic due to inflationary uncertainties. Revision of the Banking Act, diversification of financial market assets, tighter prudential regulations, etc. played a pivotal role in improving financial intermediation but the real gains of such reforms are yet to be fully realized. Akinsola and Odhiambo, 2017 review of various empirical studies on the impact of structural reforms on financial intermediation and private investment in SSA uncovered mixed results — the findings showed that structural reforms were not implemented uniformly; hence, the impact

varied across SSA. The study did however observe a positive dynamic between credit, capital formation and growth.

Muyambiri and Magali's 2020 study looked at the association between financial development, capital formation, national savings, and growth in Tanzania and Kenya between 1990 and 2017. The study showed conflicting results using various metrics of financial sector development. Using domestic credit as an indicator of financial reform, the study established a strong linear impact of domestic credit on both investment and growth. This finding is supported by a previous study of undeveloped and developing economies in Africa. Oshikayo, 1994, analyzed the function of credit to private sector capital formation. According to the findings, lending to the private sector appears to have a considerable impact on capital formation. Erden and Holcombe, 2005 study asserts that bank lending constrains private sector capital formation in developing countries, but public investment had a positive linear impact on private capital formation.

The Feldstein-Horioka (FH) Puzzle Theory of 1980 was empirically tested by David, A. C., et al. in 2020. In both advanced and developing countries, the study attempts to discover and explain the empirical evidence of the savings-investment nexus. The findings revealed a strong endogenous savings-investment correlation that can be used to infer causality in emerging countries. However, correlation is not significant in advanced economies, which can be explained by other exogenous factors not considered in the research. The study recommends that policymakers implement policies that encourage domestic savings, such as reforms aimed at improving financial sector competitiveness which will ameliorate the cost of providing financial services, improve financial intermediation, and investment. The policy advice is based on the fact that, while international capital flows are important for investment, low domestic savings tend to restrict investment. Salmani, et.al, 2016 study found that the evidence of savings having a positive and significant influence on investment is true for advanced economies, but in developing markets, savings is positive but negligible. Mndeme, 2015 uncovered fascinating findings in Tanzania about the connection between savings, domestic capital formation, and growth. The study found a negligible connection between savings and growth, but a favorable relationship between investment and GDP. According to previous studies, rather than savings determining growth, growth drives changes in savings (Mühleisen, 1997; and Carroll-Weil, 1994).

### **2.4.3 Public Debt and Private Investment**

Mutunga, 2020 studied the consequences of national debt on private capital formation in Kenya. Using data from 1980 to 2019, he applied the ARDL approach to investigate the variables long-term relationship. The crucial findings suggest that while public debt offers few short-term benefits, its long-term effects on private investment and growth are far-reaching. Both domestic and external debt have been observed to have a favorable impact on private investment. Debt servicing, on the other hand, was found to have the strongest impact on private investment, growth, and public investment in capital projects. Significant capital outlays to international public debtholders are counterproductive to long-term economic productivity, private and government investment. However, Salyungu and Felician, 2019 observed that because the proportion of public debt to GDP is below onerous levels (IMF recommends the proportion of public debt 40% of GDP), their study confirms that public debt is positively associated with private capital formation, implying a crowding effect. Albeit Tanzania's public debt as a percentage of GDP (36.6% in 2017; 37.6; and 37.8% in 2018) is below IMF debt threshold of 40% for developing countries.

Mutuku and Kinyanjui, 2018 used the VAR Model to analyze the association between public debt and capital formation in the private sector in Kenya, covering the period 1960 to 2016. The findings show that using domestic debt to cover fiscal deficits and public investment has negative consequences for private credit and investment. It further observed that Interest rate capping shifted commercial lending towards public investment; thus, government should seek external financing to curb the current crowding out effect and consider a conservative approach towards fiscal planning. A prior study (1980-1997) of the relationship between public and capital formation in emerging and advanced produced varying conclusions. Fiscal spending elicited a positive parallel response from private investment in developing markets, while in advanced economies, public investment crowded out private capital formation. The findings further indicated that a ten percent increase in fiscal spending in developing nations supported a two percent increase in private investment (Erden & Holcombe, 2005).

Njuru, et al., 2014 presented empirical evidence claiming that public expenditure on capital projects and recurrent fiscal commitments crowded in private investment in Kenya. Using the VAR estimation technique for the period 1963-2012, the evidence affirms that public expenditure was good for private investment, resulting in enhanced performance. Attempts by

the government to trim fiscal expenditure rather discouraged private investment. The paper recommends the government to expand the fiscal envelope and direct capital expenditure towards development-oriented projects that will further crowd in private investment. However, Gunarsa, Makin and Rhode, 2013, study of 25 Asian countries established an anemic negative relationship between public debt and growth; estimating a 10 percent increase in public borrowing precipitates a decline in growth anywhere between 0.2 to 0.4 percent.

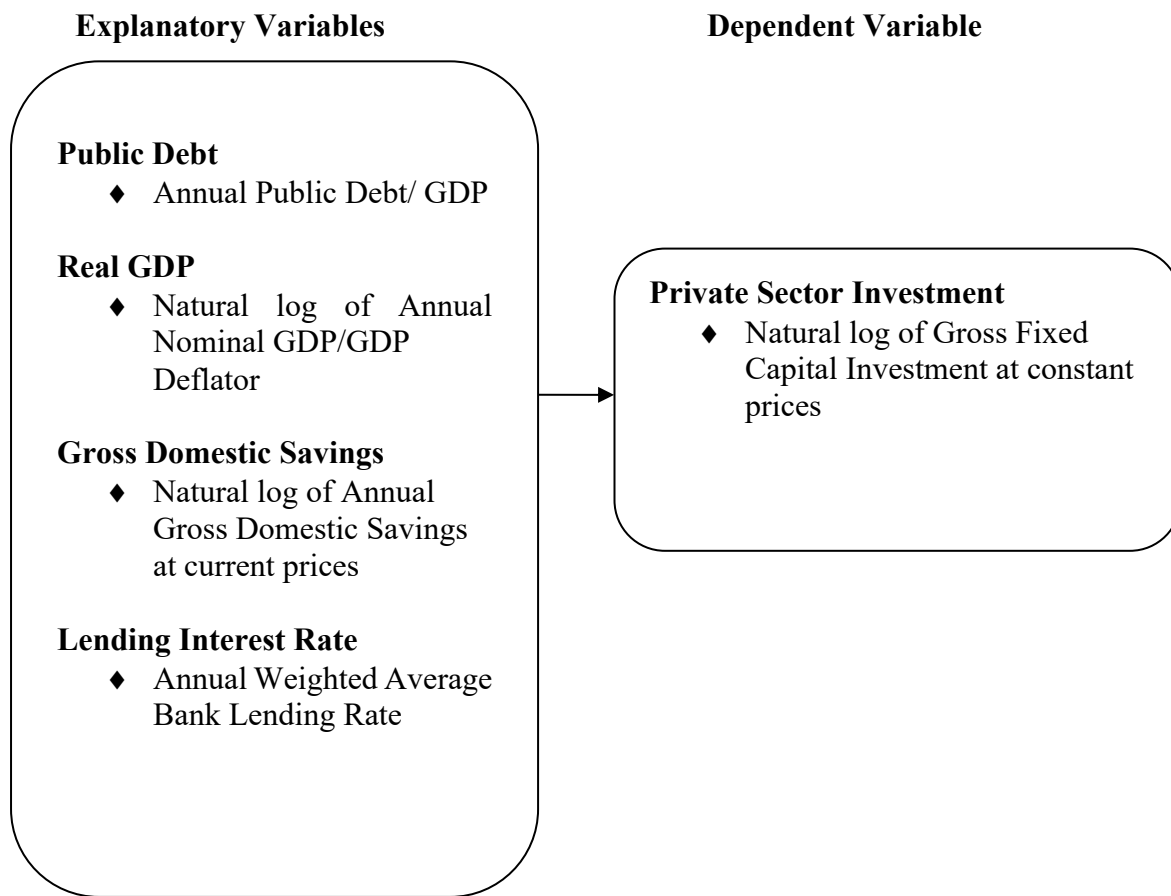
## **2.5 Conceptual Framework**

According to the crowding out theory, there are prohibitive public debt levels at which private investment is crowded out; while crowding in theory claims that public debt and investment facilitate private investment. Keynes, 1936 estimated the Savings-Investment Equality Model, seemingly asserting the dependence of investment on savings. Financial liberalization went further by prescribing that structural reforms and financial sector development were needed to improve financial intermediation (savings and lending) and boost private investment (McKinnon & Shaw, 1973). Jorgenson, 1963 Neoclassical investment theory analyzed that the cost of capital had a substantial impact on investment expected returns and expenditure.

Empirical studies have captured the existence of a relationship between the selected Macroeconomic variables and private investment – Public debt (Mutunga, 2020 and Njuru, et.al, 2014); Savings (David, A. C., et. al, 2020; and Mndeme, 2015); financial reform and financial intermediation (Muyambiri, B. & Magali, J. 2020; Fowowe, 2009; and Akinsola and Odhiambo in 2017).

As depicted below (Fig. 2.1), the study intends to further explore the nature and extent of the relationship between the explanatory variables – public debt, real GDP growth, domestic savings and lending interest rates, and the dependent variable – private investment.

**Figure 2.1**



## **2.6 Summary of Literature Review**

Evaluation of empirical findings has reflected different levels of concurrence and divergence with the theoretical literature. The anchoring theories of the study have all outlined the macroeconomic factors affecting private investment. Investment theories emphasized changes in output/GDP and interest rates as critical factors; financial liberalization and intermediation hypothesized that market-derived interest rate is critical in mobilizing domestic savings and credit for capital formation; while crowding in and crowding out theories placed priority on the different effects of public debt on private investment.

According to empirical literature, GDP, real interest rates, public investment, and inflation are important predictors of private investment. Other studies have assessed that financial intermediation is critical to investment and growth. Research findings have also recorded both negative and positive effects of structural reform and financial sector development on private

investment. Studies on the influence of public debt on capital formation have also documented conflicting results.

An overwhelming body of empirical literature confirm that changes in GDP is the major determinant of private investment. However, the role of structural reforms, financial intermediation and public debt have produced mixed empirical evidence. Therefore, this study will employ a correlation and multivariate regression analyses to explore the relationship between the explanatory variables and the dependent variable in an attempt to offer some degree of synthesis and explanation to the different findings.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

The various research methods and procedures adopted by the study are detailed in this section. This section provides information on the following: the research design, population of the study, data collection procedure, data analysis techniques, diagnostic tests, and analytical model.

#### 3.2 Research Design

According to Mugenda and Mugenda, 2003 the research design provides a well-structured blueprint by which a research is organized to investigate and provide answers to the research problem of interest.

Because the independent variables of research interest were preselected, a Descriptive Research Design using correlation and regression estimation models was applied to investigate the relationship between the research variables. Preselecting the independent variables of interest excludes other variables which studies have determined to have statistical significance to the dependent variable. This research approach controls for the exclusion of other independent variables by simply observing and describing the relationship between the preselected variables. This method is commonly used to define and quantify the relationship between two or more variables (Rijbarova, 2005).

#### 3.3 Population of the Study

Secondary data on private sector investment, public debt, Real GDP, domestic savings, and lending interest rate constituted the study's population. The study used annual time series data from 1996 to 2019 due to limitation in accessing reliable data on public debt beyond 1996.

#### 3.4 Data Collection

Secondary time series data on the following macroeconomic variables – private investment, public debt, Real GDP, domestic savings, and lending interest rates were acquired from the Central Bank of Kenya (CBK) and World Bank National Account Data.

### **3.5 Data Analysis**

EViews 12 Statistical Packages was utilized for multivariate regression analysis, employing the Ordinary Least Square (OLS) estimation approach. While Stata 15 Statistical Package was used for correlation analysis. For purposes of interpretation, data analysis included translation of study data into functional formats from which conclusions and inferences were drawn. Both descriptive and inference analyses were used. The descriptive study comprised the following: the use of arithmetic mean, standard deviations, overall number of observations, maximum and minimum number of observations. Inferential analysis was based on regression analysis, after which several tests were conducted to ensure the OLS assumptions were maintained. Pearson's Correlation Coefficient Test was conducted to estimate the degree of correlation between private sector investment and each explanatory research variable.

#### **3.5.1 Diagnostic Tests**

The following tests were conducted – normality, autocorrelation, multicollinearity, heteroskedasticity, parameter stability, and model specification. Normality test assessed whether the sample data were abstracted from a naturally dispersed population. Correlation matrix was used to determine the degree of correlation between the predictor variables. Multicollinearity test evaluated the strength of the connection between the independent variables. Heteroscedasticity was carried out to determine if the residual variances are consistently measured differently (Verbeek, 2012). Cumulative sum (CUSUM) square test was conducted to test the stability of the model. Ramsey RESET test was conducted to determine if the model is well-specified. These tests were carried out to establish whether the model fits the assumptions of the OLS approach. To visualize the trends, observations and general pattern of the data, graphical analysis was used.

#### **3.5.2 Analytical Model**

Private Sector Investment is the variable whose behavior is being assessed for the regressors – Public Debt, Real GDP, Domestic Savings, and Lending Interest Rates. Using secondary data for the period under review, a multivariate Log-Log regression analysis of the variables was employed to assess the extent to which changes in the regressors impact the dependent variable. The coefficients of macroeconomic variables are denoted by  $\beta$ .



**The analytical model specification:**

$$LPSI = \beta_0 + \beta_1T + \beta_2LDS + \beta_3I + \beta_4PD + \beta_5GDP + \mu$$

Where,

PSI = Private Sector Investment

$\beta_0$  = Constant

T = Linear Trend

$\beta_1, \beta_2, \beta_3, \beta_4,$  and  $\beta_5$  = Macroeconomic variables coefficients

L = Natural Logarithm

PD = Public Debt

GDP = Real GDP

DS = Domestic Savings

I = Lending Interest Rates

$\mu$  = Error Term

**Table 3. 1 Variables Measurement**

No.	Macroeconomic Variables	Operationalization
1.	Private Sector Investment	Measured as the natural log of Gross Fixed Capital Investment in constant prices
2.	Linear Trend	Measured changes in the value of the time series at a constant rate
3.	Public Debt	Measured as Public Debt / GDP
4.	Real GDP	Measured as the natural log of Nominal GDP/GDP Deflator
5.	Domestic Savings	Measured as the natural log of Gross Domestic Savings at current prices
6.	Lending Interest Rates	Measured as a Weighted Average Commercial Bank Lending Rate
7.	Error Term	Is the residual variables not explicitly captured in the model
8.	Beta Coefficient	The coefficient of values representing the various independent variables.

### **3.5.3 Definition of Variables**

**Private Investment:** Total annual expenditure on fixed capital assets acquired by private sector firms. For analytical purposes, it can be contextualized as a percentage of GDP or represented as the natural log of gross fixed capital formation in constant or current prices.

**Public Debt:** Refers to an aggregate of domestic and foreign debt owed by the Kenyan government to debtholders. Typically acquired via the floatation of bonds and treasury bills, as well as commercial and concessional loans. For analytical purposes, it is usually contextualized as a percentage of GDP.

**Real GDP:** Is yearly aggregate output adjusted for inflation using the GDP Deflator. Economic output refers to the prices of final goods and services generated in an economy over a given time period, usually a year.

**Gross Domestic Savings:** refers to the aggregate residual of gross national income, after adjusting for aggregate consumption and net transfers. It represents savings from public sector (fiscal surplus), private enterprises (retained earnings), and households (residual income after taxes and consumption) in Kenya.

**Lending Interest Rates:** Is the spread between interest on deposit and lending rates charged borrowers by financial intermediaries for the use of capital over a given period. In Kenya, CBK records a monthly weighted average lending rate banks charge borrowers. Lending rates are determined with reference to the Central Bank Rate.

### **3.5.4 Significance Test**

The F-test is used to establish the overall model significance, while R<sup>2</sup>, or the coefficient of determination, is used to determine the level of variance in Private Sector Investment that is directly determined by explanatory variables. At a 95% confidence level, the direction and intensity of the association between selected macroeconomic factors and private sector investment in Kenya was investigated using correlation analysis.

## CHAPTER FOUR

### RESEARCH FINDINGS AND DISCUSSION

#### 4.1 Introduction

The empirical results from data gathered and processed using EViews 12 and Stata 15 Statistical Package are presented in Chapter 4. It explains the graphs, summary statistics, residual diagnostic tests, and empirical results from the estimated correlation model. Further in this chapter, results of the regression analysis and ANOVA will be presented. There are five components in this chapter: descriptive analysis, diagnostics tests and results, correlation analysis, results from the multivariate regression analysis, and discussion of the research findings.

#### 4.2 Descriptive Analysis

In this section, a quantitative description of the series is presented to summarize the basic features and characteristics of the variables. The mean and median, two of the most well-known measures of central tendency are described, as are six additional measures of variability: variance, standard deviation, minimum, maximum, kurtosis, and skewness. Below, Table 4.2 presents the summary statistics for a 24-year period, on an annual basis (1996-2019).

**Table 4.2: Descriptive Statistics**

<b>Variables</b>	<b>Mean</b>	<b>Median</b>	<b>Max</b>	<b>Min</b>	<b>Std. Dev.</b>	<b>Skewness</b>	<b>Kurtosis</b>
LPSI	22.709	22.762	23.433	21.873	0.552	-0.076	1.404
LDS	22.029	22.393	22.793	20.838	0.655	-0.436	1.661
I	17.872	16.3	33.79	12.44	5.914	1.446	4.124
PD	56.6	56.55	78.7	40.7	10.437	0.33	2.546
LGDP	22.233	22.087	24.313	19.475	1.096	-0.272	3.182

**Source: Research Findings (2021)**

Private Sector Investment (LPSI) has a minimum and maximum value of 21.873 to 23.433, with a mean and median of 22.709 and 22.762, respectively, according to table 4.2. LPSI has a high level of consistency, as illustrated by the closeness of the range between mean and median values. The properties of the data imply that they are reliable for predictions and conclusions. Furthermore, compared to Public Debt (PD), which has a standard deviation of 10.437, LPSI has a standard deviation of 0.552, indicating that its values are closer to the mean. The mean and median values of public debt are also the highest. The values of Domestic Savings (LDS) span from 20.838 to 22.793. LDS has a higher average value than LPSI but a lower average value than the other variables. The standard deviation of Real GDP (LGDP) is 1.096, which is higher than Lending Interest Rate (I) and PD but lower than LPSI and LDS.

With a skewness of 1.446 and 0.330, respectively, I and PD are positively skewed. This means that the distribution of these variables are rightward skewed. PD, on the other hand, is closer to zero than I. As illustrated above, the rest of the series is negatively skewed. The positive value of the kurtoses indicates that all of the variables have long tails. However, the kurtoses of lending rate and real GDP are more than 3, at 4.124 and 3.182, respectively. The tails of LPSI, LDS, and PD are all less than 3, implying that their distributions are just about normal.

### 4.3 Diagnostic Tests

A few essential estimation tests were done to ensure that the findings are consistent and reliable. The tests included, Autocorrelation, Heteroskedasticity, Normality, Specification, Multicollinearity, and Model Stability tests. Test results and qualification are shown in Table 4.3.

**Table 4.3 Diagnostic Tests Results**

Test	Test Statistic	P-value	Null Hypothesis
Autocorrelation	Obs*R-squared=1.500	0.597	No Autocorrelation
Heteroskedasticity	Obs*R-squared=7.167	0.209	Constant Variance
Normality	Jack-Bera Stat=1.227	0.541	Normal Distribution
Specification Test	F-Stats(2,7)=2.266	0.134	No Omitted Variable

**Source: Research Findings (2021)**

The result of the Lagrange multiplier test for residual autocorrection has a probability value of 0.597, which is greater than the 5% (0.05) limit, as shown in Table 4.3. As a result, we infer that the model's residual is not serially correlated. Furthermore, the Breusch-Pagan-Godfrey test for residual heteroscedasticity yielded a p-value of 0.205, which is higher than the 5% threshold. This means that we do not reject the null hypothesis of constant variance, thus, the estimated model is homoscedastic. The Jack-Bera test result confirmed that the residual is a normal distribution as evident by the p-value of 0.541. The Ramsey RESET test result point to a well-specified model. It has a high p-value of 0.134.

#### 4.3.1 Test for Multicollinearity

An inter-relationship among two or more explanatory variables leads to wider confidence interval that generate inconsistent and unreliable probabilities about the influence of the explanatory variables in the model. Multicollinearity can cause results that are skewed and misleading. Therefore, a test for multicollinearity is conducted to ensure there is no linear dependency between the explanatory variables. The test results are shown by table 4.3.1

**Table 4.3.1 Multi-Collinearity Test Result**

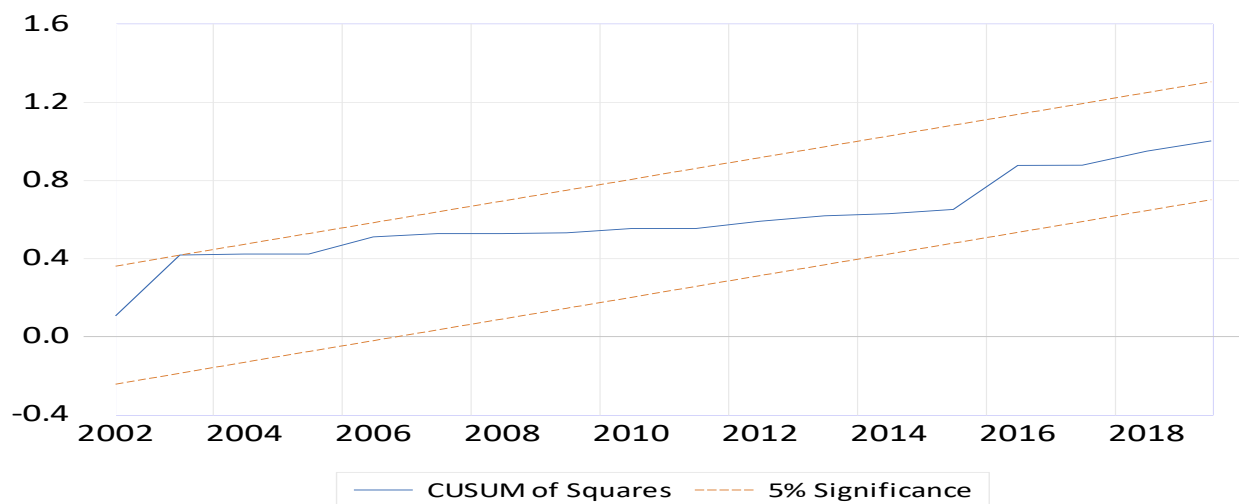
Variables	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.589	2836.305	NA
LDS	0.004	2360.516	1.996
I	0.000	19.153	1.819
PD	0.000	57.342	1.81
LGDP	0.001	711.492	1.653

When the centered VIF is less than 10 it shows there is no existence of linear dependency among the explanatory variables. The test results in Table 4.3.1 indicate the non-existence of multicollinearity since the centered VIF values are below 10.

#### 4.3.2 Test for Parameter Stability

The cumulative sum (CUSUM) square test is used to test the stability of the model. The test result shows that the CUSUM of squares lies within a specified boundary. The model is, therefore, stable. Figure 4.3.2 reports the test result.

**Figure 4.3.2 Test for Parameter Stability**



Source: Research Findings (2021)

#### 4.4 Correlation Analysis

To define the degree of correlation between private sector investment and each of the research variables, the study used Stata Statistical Package Version 15 to run the Pearson's Correlation Coefficient Test. The results of the correlation test are presented in Table 4.4, along with a thorough description of the correlation between the variables. The figures in the parenthesis represent the probability values of the correlation coefficient.

**Table 4.4 Correlation Analysis**

	<b>LPSI</b>	<b>LDS</b>	<b>I</b>	<b>PD</b>	<b>LGDP</b>
LPSI	1.000				
LDS	0.928(0.000)	1.000			
I	-0.610(0.002)	-0.493(0.015)	1.000		
PD	-0.606(0.002)	-0.631(0.001)	0.455(0.025)	1.000	
LGDP	0.662(0.000)	0.449(0.028)	-0.581(0.003)	-0.237(0.265)	1.000

Source: Research Findings (2021)

The Pearson Correlation Coefficient test was used to determine the relationship between private sector investment (LPSI) and each of the study's variables – domestic savings (LDS), lending interest rate (I), public debt (PD), and real GDP (LGDP). It is suitable for the research

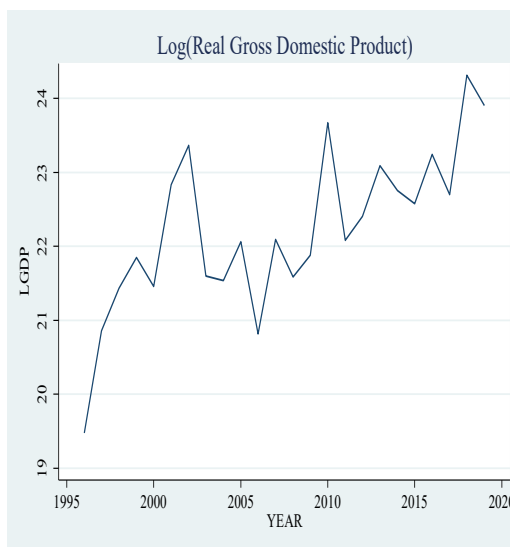
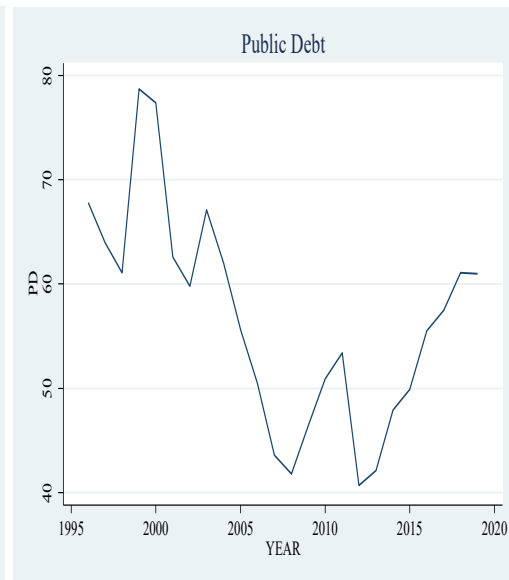
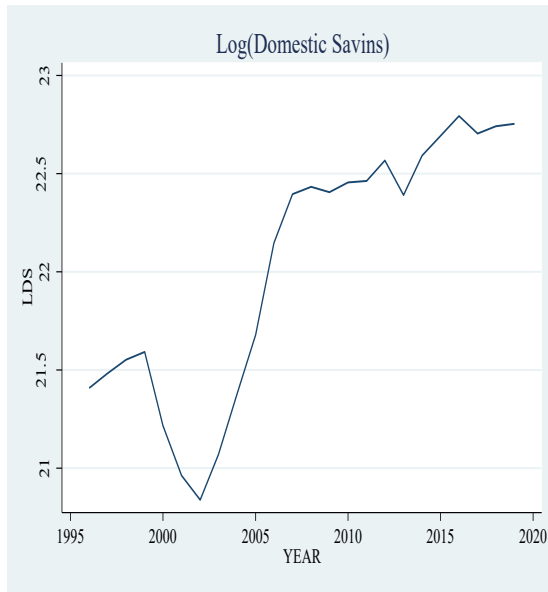
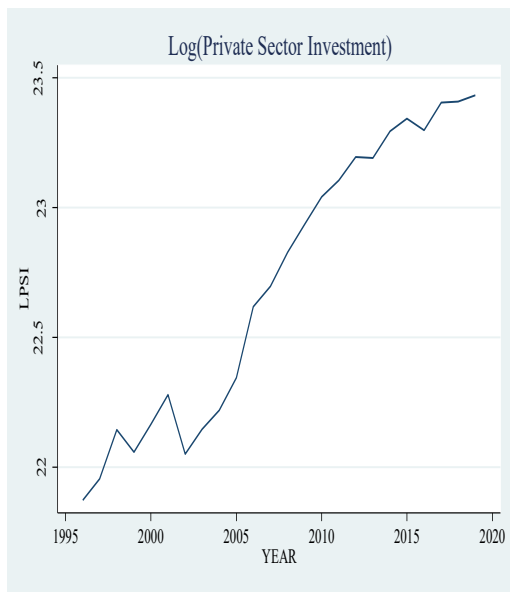
since it establishes the strength and direction of the association between the variables. At a p-value of 1%, the correlation between private sector investment and each of the study's variables is statistically significant, according to the results of the correlation test. However, the direction of relationship between private investment and each variable exhibited asymmetry as some variables correlation with private sector investment was positive, while others registered a negative correlation.

At a p-value significance level of 1 percent, both domestic savings (LDS) and real GDP (LGDP) correlation tests established strong positive correlations with private sector investment, as evidence by the coefficients of 0.928 and 0.662, respectively. To the contrary, lending interest rate (I) and public debt (PD) correlations with private sector investment tests yielded a negative coefficient of -0.610 and -0.606. At the significance level of 1 percent, both associations are significant.

#### **4.5 Graphical Analysis**

A graph is essential for displaying data in time series analysis. It is used as a preliminary screening tool to see if the series exhibits an explosive behavior, a time trend, or seasonality. To identify the trend or pattern of each variable, the observations are plotted against the time of the observation as shown by figure 4.5.

**Figure 4.5: Two-way Line Graphs**





Majority of the variables in figure 4.5 have upward and downward trending patterns. Usually, a misspecified model is derived when important variables are either excluded or not properly specified in an empirical model. Given the trends observed with the series, a linear trend is utilized to address misspecification should it arise.

#### 4.6 Multivariate Regression Analysis

To meet the specific objectives of the study, Private Sector Investment (LPSI) was regressed on Domestic Savings (LDS), Public Debt (PD), Lending Interest Rate (I), and Real GDP (LGDP). The model included a constant and linear trend given the properties of our variables. Table 4.6 reports the result of the estimation and ANOVA.

**Table 4.6: Results of Multiple Regression Analysis**

<b>Dependent Variable: LPSI</b>			
<b>Variable</b>	<b>Coefficient</b>	<b>t-Statistic</b>	<b>p-value</b>
C	16.606	8.704	0.000
TREND	0.057	6.389	0.000
LDS	0.222	3	0.008
I	0.009	1.967	0.065
PD	-0.004	-1.878	0.077
LGDP	0.029	1.05	0.308
<b>ANOVA</b>			
R-squared	0.982	Log-likelihood	28.812
Adj. R-squared	0.977	F-statistic	194.672
S.E. of regression	0.084	Prob(F-stat)	0.000
SSR	0.127	D-W stat	1.566

**Source: Research Findings (2021)**

##### 4.6.1 Goodness of Fit and Overall Significance

The R-squared or Coefficient of Determination is 0.982. This means that 98.2 percent of the changes in Private Sector Investment (LPSI) is determined by the explanatory variables. Furthermore, the Adjusted R-squared coefficient of 0.977 suggests that the explanatory

variables are significantly responsible for any changes in Private Sector Investment. At a p-value of 0.000, the F statistics justifies the overall fit of the model. This implies that all the explanatory variables jointly influence private sector investment.

#### 4.6.2 Regression Coefficients

Below is the results from the multivariate Regression Model:

$$\text{LPSI} = 16.06 + 0.057T + 0.222\text{LDS} + 0.009I + -0.004\text{PD} + 0.029\text{GDP} + 0.084 \mu$$

Where,

LPSI = Private Sector Investment

T = Linear Trend

LDS = Domestic Savings

I = Lending Interest Rate

PD = Public Debt

GDP = Real GDP

Domestic Savings has a positive elasticity of 0.222, which is statistically significant at a 1 percent level, as the p-value demonstrates. A 1 percent increase in domestic savings will result in a 0.222 percent increase in private sector investment.

The elasticity of lending interest rate is positive and statistically significant at a 10 percent level. It indicates that when lending rate rises by 1 percent, it will induce an increase in Private Investment by 0.009 percent.

The elasticity of Public Debt is negative and significant at a 10 percent significant level. An increase in Public Debt by 1 percent will trigger a fall in Private Sector Investment by 0.004 percent.

Real GDP has a positive elasticity which is not significant. However, a rise in real GDP by 1 percent will lead to an increase in Private Sector Investment by 0.029 percent.

### 4.6.3 Discussion and Interpretation of Research Findings

This paper intends to observe and explain the extent of the relationship between the independent and response variables, using Pearson Correlation and Multivariate Regression Analyses. However, the basis for analytical analysis is the results from the Multivariate Regression Model as indicated in Chapter Three. Private sector investment is the response variable, while Domestic Savings, Lending Interest Rate, Public Debt and Real GDP are the explanatory variables. Annual time series data (1996-2018), constituting 24 observations were tested and regressed to estimate the association between the variables.

The Pearson Correlation Test and multivariate regression analysis results illustrate that the relationship between domestic savings and private sector capital formation is positive and strong. At the 1 percent significance level, a p-value of 0.000 and a correlation coefficient of 0.928 depict a significant positive association between domestic savings and private sector investment. According to the regression coefficient, domestic savings has a positive elasticity of 0.222, which is statistically significant at a 1 percent level, as evidenced by the p-value. Based on the regression model estimates, a 1 percent rise in LDS will elicit a 0.222 percent increase in Private Sector Investment. Results from the empirical models are supported by Keynes 1936 postulations about the reliance of investment on national savings. Although Keynes Saving-Investment Equality model is not a practical reality in most economies, in principle he reasoned that national savings resources are directed towards investment; hence, investment is heavily reliant on national savings. Furthermore, the findings of the regression and correlation analyses are consistent with David, et. al, 2020 empirical assessment on the savings-investment nexus. David, et. al, 2020 study reveals that domestic savings dictate the level of investment attainable in developing economies. Similarly, Mndeme, 2015 study finds that high levels of savings demonstrate the propensity to generate high levels of investment. In contrast to industrialized economies, the association between savings and capital formation in developing countries is positive but statistically insignificant, according to a 2016 study by Behzed, et al.

According to the findings from the correlation analysis, lending rate has a strong association with private sector capital formation, however the relationship is inverse. At the 1 percent significance level, a p-value of 0.002 and a correlation coefficient of -0.610 illustrate a

significant negative correlation between lending interest rate and private sector investment. The regression analysis estimates that lending interest rate (I) has a positive coefficient of 0.009 at a p-value of 0.065. Thus, its elasticity is positive and statistically significant at a 10 percent level. This implies that when Lending Interest Rate (I) grows by 1 percent, it precipitates an increase in Private Sector Investment (LPSI) by 0.009 percent. This empirical observation can be linked to financial liberalization theory on interest rates. McKinnon and Shaw, 1973 liberalization argument enthused that when market forces dictate interest rates in developing economies, higher levels of savings, credit, and capital accumulation will be induced. This assertion is supported by the realization of positive real interest in Kenya in 1996, albeit almost a decade after initiating comprehensive financial sector reform in 1989 (Ngugi & Kabubo, 1989). Mbaye, 2012 study finding contradicts the regression results of this study. Domestic credit, which is a proxy for lending conditions, is inversely associated with investment, according to Mbaye, but the statistical significance of this association in Kenya is negligible. But Muyunbiri and Magali's 2020 assessment reveals a robust and positive correlation between domestic credit and investment in Kenya and Tanzania. In 19 Sub-Saharan African (SSA) economies, financial sector development translated into improved intermediation (savings and lending) which bolstered private investment (Fowowe, 2009). Additional research in 30 SSA economies revealed a strong positive dynamic between domestic credit and private capital formation (Akinsola & Odhiambo, 2017). According to Itumu and Abdul 2018 study, lending rates in Kenya are dictated by inflation and public borrowing; thus, policy interventions to lower inflation and public debt-driven pressures on lending rates will be plausible.

At the 1 percent significance level, a p-value of 0.002 and a correlation coefficient of -0.606 depict a significant negative association between public debt (PD) and private sector investment (LPSI). The regression analysis estimates that public debt has a negative coefficient of -0.004 at a p-value of 0.077. Consequently, its elasticity is negative and statistically significant at a 10 percent level. Public debt is the only variable that registered a negative regression elasticity of -0.004, implying that public debt *crowds out* private sector capital formation in Kenya. The negative effect observed relates to classical economists' reservation about excessive public borrowing and is strongly aligned with the crowding out effect theory. In principle, both schools of thought claim that rising public debt increases the cost of credit, effectively crowding out private investment. Empirical finding from Mutuku and Kinyanjui, 2018 study indicates that increased public debt, particularly debt financed domestically, increases the cost of credit (lending rate) and restrains private investment in Kenya. Erden and

Holcombe, 2005 establishes a contrary effect, indicating that public spending has a positive association with private investment. The study estimates, a 10 percent increase in public investment *crowds in* private sector investment by 2 percent in developing economies. However, similar to the findings of Mutuku and Kinyanjui, 2018 study, Mutunga, 2020 study submits that public debt and its rising servicing costs adversely affected private investment in Kenya. Using different public debt classifications and ratios with respect to private investment, Salyungu and Felician, 2019 study observes both a negative and positive dynamic between public debt and private investment. Because the proportion of public debt to GDP is below onerous levels in Tanzania, the study observes that public debt crowds in private capital accumulation in Tanzania.

Result from Pearson Correlation Test indicate that real GDP and private sector investment have a positive and strong correlation. At the 1 percent significance level, a p-value of 0.000 and a correlation coefficient of 0.662 depict a strong positive association between real GDP and private sector investment. Regression analysis estimates that Real GDP has a coefficient of 0.029 and a p-value of 0.308, at a 10 percent significance level. This depicts a positive but insignificant elasticity between real GDP and private sector investment. The model estimates that a rise in real GDP by 1 percent will lead to an increase in Private Sector Investment by 0.029 percent. This finding agrees with, but does not entirely follow through with Samuelson, 1939 postulations, which reasoned that investment is highly dependent on changes in aggregate income or demand; while the study finding indicate a positive but insignificant reliance. On the empirical front, a study conducted in Ghana by Frimpong and Marbuah, 2010 assessed that changes in GDP significantly impacts private investment in the long run but its short run effect is minor. The study approximates that a one percent increase in GDP elicits an increase in private sector capital formation of over forty percent. While results from Mbaye, 2012 study aligns to some degree with the empirical results of this paper. Results of Mbaye 2012 study establishes that real GDP has a positive relationship with investment but the extent of said relationship is strong, which contradicts the insignificant relationship established by the empirical results of this paper. Anwanyu, 2013 study associates high levels of investment with high GDP per capita. Elsewhere in Tanzania, study conducted by Mndeme in 2015 confirms that there is a strong positive connection between investment and GDP.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

Summary of the results from the empirical model will be used to draw inferences and conclusions. Issues which one way or another placed unnatural limitations on the empirical scope of this paper will be stated and explained to provide clarification and transparency to the audience of this project. To academia, recommendations on expanding the research coverage and scope will be proffered. Likewise, to policy makers, policy recommendations will be advanced based on the empirical results of this project.

#### 5.2 Summary

Consistent with the prescriptions of *financial liberalization theory*, this study findings submit that financial intermediation – domestic savings and credit provision weigh heavily on the performance of private capital formation in Kenya. Evidence of public debt negative relationship with private investment is akin to classical economists' apprehension towards excessive public spending and involvement in the economic affairs of the state. However, the study's finding regarding economic output role in augmenting capital formation is positive but with little significance. This goes contrary to Keynes theoretical postulations that changes in aggregate output significantly predict the level of capital assets accumulation in an economy. Hence, the model results highlight the importance of domestic savings, cost of domestic credit, GDP, and public debt in stimulating or restricting private capital formation. These empirical findings address the specific research objective of this paper – observe and describe the empirical association between the referenced variables.

In summary, the study submits that there is a strong positive association between private sector investment and domestic savings in Kenya. Interest charges levied by commercial banks in providing credit is observed to also have a strong and positive relationship with investment. The empirical connection between public debt and private investment is found be to negative and significant. The model further estimates that real GDP association with private investment is positive but insignificant.

Based on the R-Squared of 0.977, the explanatory variables used in the model adequately describe the behavior of private investment. Hence, the explanatory variables account for 98

percent of the variation in private investment, while the 2 percent variation is related to variables not captured in the model. Regarding the overall fit of the model, the F statistics, with a probability value of 0.000 shows that the predictor variables interact to influence the dependent variable.

### **5.3 Conclusion**

According to the results from the model, domestic savings and lending rates strongly dictate the performance of private investment. Hence, as suggest by David, et.al, 2020 higher levels of domestic savings is desirable to improve private sector investment. Since the empirical result suggests lending rate is critical, the factors that influence its determination need to be managed. Findings from Itumu and Abdul, 2018 submit that inflation and public borrowing dictate the cost of credit in Kenya. Thus, monetary and fiscal policies should manage inflation and public debt burden to possibly reduce the pressure they impose on interest rates. The model result also establishes an inverse relationship between public debt and private sector investment; hence, public debt financing should be rationalized in alignment with IMF fiscal consolidation recommendations to relieve the economy of its huge public debt burden (69.3% in 2020). Finally, the study findings submit that real GDP relationship with private investment is positive but minor. This finding contravenes most theories and empirical studies, which state that GDP is strongly linked to private investment performance (Anwanyu, 2013; Frimpong & Marbuah, 2010; Mbaye, 2012; Mndeme, 2015).

### **5.4 Recommendations for Policy and Practice**

It has been over ten years since vision 2030 was adopted by the Kenya government. As per the First and Medium-Term assessment reports, domestic savings, private investment, and economic growth performances are below desired projections. Public measures in the areas of fiscal planning and monetary policy strategy need to be recalibrated to address the underperformance observed in the referenced economic metrics.

Generally, the findings imply that greater financial intermediation (savings and credit) and public debt management will help augment private capital formation. Thus, the Kenyan government needs to prioritize further financial sector development to improve financial intermediation. Investment financing in the public domain should shift away from debt reliance to revenue expansion. Fiscal planning should be rationalized to expand the revenue envelop, and if debt financing is needed for capital projects, fiscal deficit and operations, external debt

on concessional terms should be pursued. Monetary policy regime should target moderating inflation to low and stable levels. This would help achieve positive real interest rates and reduce the costs of borrowing to augment financial deepening and private investment.

### **5.5 Limitations of the Study**

Access to reliable data on public debt for periods beyond 1996 proved particularly impossible to acquire. This limited the time series coverage of the study to a 24-year period, spanning from 1996 to 2019. High p-values which exceed the normal significance level of  $\leq 0.05$  *may somewhat* be linked to the small sample size used in the study. Additionally, the study seeks to observe and explain the relationship between the variables; not establish causality or estimate the long and short run behavior of the variables. Regression and correlation analyses were used to analyze the data set. These estimation models are limited in robustly defining, measuring, and analyzing the research variables. Hence, the findings presented here cannot be independently and entirely relied upon to make inferences, generalizations, and predictions about the research variables. Using more rigorous empirical models while extending the research period to increase the sample size and include other variables could yield empirical results different from the ones reported in this study.

### **5.6 Areas for Further Research**

The macroeconomic variables that substantially affect private investment are more than the ones captured in this research project. A number of studies have indicated other variables such as real exchange rate, inflation, economic growth etc., as critical macroeconomic predictors of private investment. Besides, there are more advanced research techniques, the likes of vector autoregression, ARDL, etc. which can be applied to better assess the relationship between the macroeconomic variables. Additionally, the period under review is limited due to difficulty in acquiring quality secondary data for some variables. Based on the preceding observation, I recommend a more robust approach, i.e, ARDL be used, covering a larger sample size and broader range of variables to evaluate the macroeconomic drivers of private investment in Kenya.



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