

**DOMESTIC INVESTMENT AND ECONOMIC GROWTH IN UGANDA: A
TIME SERIES ANALYSIS (1985 – 2023).**

BY

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(23/U/0500/MEC/PS)

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DECLARATION

I, Olak Kenneth Kaunda, hereby declare that this dissertation entitled “Domestic Investment and Economic Growth in Uganda: A Time Series Analysis (1985–2023)” is my original work and has not been submitted for any degree or award at this or any other university or institution of higher learning. All sources of information have been acknowledged accordingly.



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APPROVAL

This is to certify that this dissertation entitled “Domestic Investment and Economic Growth in Uganda: A Time Series Analysis (1985–2023)” has been submitted to the Faculty of Business and Development Studies, Gulu University, with our approval as the candidate’s academic supervisor.

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DEDICATION

I dedicate this work to my beloved family, whose unwavering love, support, and sacrifices have been the foundation of my academic journey. I am especially grateful to my parents, the late Mr. Okello Max and Mrs. Santina Adwar, for instilling in me the values of hard work, perseverance, and integrity.

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LIST OF ABBREVIATION AND ACRONYMS

BoU	Bank of Uganda
GFCF	Gross Fixed Capital Formation
GCF	Gross Capital Formation
IMF	International Monetary Fund
UBOS	Uganda Bureau of Statistics
URA	Uganda Revenue Authority
WTO	World Trade Organization
AfDB	African Development Bank
EAC	East African Community
FSD	Financial Sector Development
GCF	Gross Capital Formation
UIA	Uganda Investment Authority
ARCH	Autoregressive Conditional Heteroscedasticity
ADF	Augmented Dickey-Fuller
AR	Autoregression
ARDL	Autoregressive Distributed Lag
CUSUMQ	Cumulative Sum of Squares
DF	Dickey-Fuller
ECT	Error Correction Term
FDI	Foreign Direct Investment
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GDP	Gross Domestic Product
JB	Jarque-Bera
ICT	Information and Communication Technology
LM	Lagrange Multiplier
MoFPED	Ministry of Finance Planning and Economic Development
OLS	Ordinary Least Squares
PP	Phillips-Perron
RESET	Regression Equation Specification Error Test
SBIC	Schwarz Bayesian Information Criteria

VAR	Vector Auto-Regression
VECM	Vector Error Correction Mechanism
WDI	World Development Indicators
CAGR	Compound Annual Growth Rate
WB	World Bank
ISI	Import substitution industrialization
R&D	Research and development

ABSTRACT

This study examines the impact of domestic investment on economic growth in Uganda, focusing on the roles of public sector investment (PSI), private sector investment (PrSI), and the moderating effects of monetary policy variables, namely the interest rate (IR) and the exchange rate (EXR). The study is motivated by the persistent inconsistency between rising investment levels and fluctuating economic growth in Uganda, raising concerns about the effectiveness and efficiency of investment in driving sustainable development. Using annual time-series data for 1985–2023, sourced from the World Development Indicators (World Bank) and the Bank of Uganda, the study employed the Autoregressive Distributed Lag (ARDL) modeling approach with secondary quantitative data. This method is suitable given the mixed order of integration among variables and its ability to capture both short-run dynamics and long-run equilibrium relationships. The analysis was conducted using Stata (version 15). The empirical findings show a statistically significant long-run relationship among economic growth, public investment, and private investment. The results indicate that private sector investment has a positive and statistically significant effect on economic growth in both the short run and the long run, highlighting its critical role as a driver of economic performance. While the public sector plays a supportive role, the results show that monetary policy variables exert varying influences on economic growth. Interest rates have a negative effect, consistent with theoretical expectations that higher borrowing costs discourage investment, while the exchange rate demonstrates a weak and statistically insignificant impact. The error correction mechanism confirms a stable adjustment process, although the speed of adjustment to long-run equilibrium is relatively slow, indicating structural rigidities in the economy.

The study concludes that the private sector is the dominant contributor to economic growth in Uganda, while the effectiveness of public investment remains limited. The study's policy recommendation recommends policies aimed at enhancing investment in the private sector, improving the efficiency and allocation of public investment, and maintaining a stable macroeconomic environment to support sustainable growth. The study contributes to the existing knowledge by providing Uganda empirical evidence using econometric model and differentiating between private and public impacts to economic growth.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Sustained economic growth is key to a nation's development, especially in developing countries like Uganda, it leads to improvements in employment creation, living standards, and poverty reduction. Economic growth is defined as the sustained increase in a nation's productive capacity over a given period of time, measured as the percentage change in real Gross Domestic Product (Barro, Mankiw, and Sala-i-Martin 1992). Despite strong GDP expansion since the mid-1980s, Uganda continues to face the challenges mentioned above. In this context, the study aims to address the problem of economic growth through domestic investment.

Domestic investment is a key channel through which both developed and developing countries expand their productive capacity. In this study, domestic investment is defined as total expenditure by residents (households, firms, and government) on buildings, machinery, equipment, and infrastructure that add to the nation's stock of physical capital and enhance future production possibilities (World Bank 2023). Conceptually, domestic investment increases the economy's capital stock, raises labour productivity, and thereby supports higher output and income over time.

In national accounts, domestic investment is measured primarily through GCF and its main component, GFCF. GFCF is the summation on fixed assets such as buildings, machinery, and equipment, and excludes changes in inventories and net acquisitions of used assets. For analytical purposes, domestic investment is often disaggregated into; Capital expenditure by government and public institutions on infrastructure and public assets are referred to as Public Sector Investment; and capital expenditure by private firms and households on productive assets intended to generate future profits is referred to Private Sector Investment (MoFPED 2023). In this study, domestic investment is taken as the solution through which Uganda can address its challenges of Economic Growth.

1.1 Background of the Study

Economic Growth and domestic investment show how nations have transitioned through various stages of development, often influenced by structural transformation, capital accumulation, and policy reforms. In classical economic thought, capital accumulation, largely driven by domestic investment, was seen as the engine of growth (Robinson 1957). Post-World War II reconstruction in Europe and rapid industrialization in East Asia demonstrated the catalytic role of domestic investment in transforming agrarian economies into industrial powerhouses. During the 1960s and 1970s, many developing countries pursued ISI strategies to stimulate investment in domestic industries. However, structural adjustment programs in the 1980s and 1990s led to a shift toward market-led reforms (Todaro 2015), with a renewed focus on private sector-led investment, macroeconomic stability, and globalization (Todaro 2015). Today, domestic investment remains central to national development agendas, particularly developing countries seeking to overcome structural constraints and achieve inclusive economic growth.

Globally, economic growth paths differ significantly between advanced and developing economies due to disparities in technological innovation, institutional quality, human capital, and domestic investment intensity (Sachs 2000). High-income nations have sustained growth through robust capital markets, strategic R&D, and stable macroeconomic governance (Cosgrove 2000; Sachs 2000). For instance, South Korea's GDP per capita increased from USD 158 in 1960 to over USD 32,000 in 2022, supported by high domestic savings and private investment in manufacturing and technology (World Bank 2023). Germany's Energiewende initiative attracted over EUR 500 billion in combined public and private investment in renewable energy between 2000 and 2020, contributing to GDP growth and energy security (Yang 2022).

In Africa, Ethiopia demonstrates how domestic investment can stimulate growth. Between 2004 and 2018, Ethiopia recorded average GDP growth rate of 9.4%, public investment contributed the largest percentage in infrastructure particularly energy (Grand Ethiopian Renaissance Dam) and transport (Addis Ababa Light Rail) (AfDB 2019). As of 2019, public investment in Ethiopia accounted for over 16% of GDP, among the highest rates of GDP Growth in the world (IMF 2021). On the private side, Kenya's M-Pesa revolution, launched in 2007, now processes over 60% of the country's GDP in mobile transactions annually, facilitating financial inclusion and small business expansion (Jack and Suri 2014). Rwanda presents another success story, where deliberate public

investment in health, education, and ICT infrastructure contributed to sustained economic growth averaging 7.2% annually between 2000 and 2019. The Kigali Innovation City project, backed by public-private partnerships, is aimed at transforming Rwanda into a regional tech hub (The World Bank Group 2021). In Nigeria, private investment in fintech has exploded in recent years, with companies like Flutterwave and Paystack attracting millions in venture capital and improving digital payment infrastructure, which contributes to the modernization of the services sector (Olaniwun 2024). Morocco has invested heavily in renewable energy through public-private partnerships, including the Noor Ouarzazate Solar Complex, one of the largest concentrated solar power plants in the world, which has enhanced energy security and reduced fiscal pressure from fuel imports (Raimi et al. 2022).

Uganda's experience since the mid-1980s reflects a similar investment-led growth narrative, but with notable fluctuations and persistent constraints. The post 1985 was the period of macroeconomic stabilization, liberalization, and the introduction of the Economic Recovery Programme in 1987. These reforms created conditions for the resumption of private investment and public investment. From the early 1990s through the 2000s, Uganda recorded relatively strong GDP growth, averaging around 6–7% per annum, supported by rising domestic investment, donor-financed public expenditure, and expanding private sector activity (MoFPED 2023; Uganda Bureau of Statistics 2022).

Over the study period (1985 – 2023), key indicators of domestic investment in Uganda have generally trended upward, with significant volatility. GFCF, which is the standard national-accounts measure of domestic investment, increased substantially from the early 1990s. GFCF rose from around 15% in the 1990s to over 23% of GDP by the early 2020s (MoFPED 2023; Uganda Bureau of Statistics 2022). This increase reflects both higher public investment in infrastructure and growing PSI in construction, telecommunications, and agro-processing.

Within this aggregate trend, public sector investment (PSI) has expanded markedly, particularly under successive National Development Plans (NDP I–III). Its investment increased from low single-digit levels in the 1990s to over 8% of GDP by the early 2020s, driven by large 2020s, driven by large projects in energy (for example, Karuma and Isimba hydropower dams), transport (such as the Kampala–Entebbe Expressway), and public infrastructure (MoFPED 2023). These investments were intended to reduce infrastructure bottlenecks, lower production costs, and create

conditions for private sector expansion. However, the rapid rise in public investment has also been accompanied by increasing public debt, implementation delays, and concerns about efficiency (AfDB 2024).

Private sector investment (PrSI), on the other hand, has also grown over time but remains below the levels associated with rapid structural transformation. Private investment has been supported by financial sector development, trade liberalization, and improvements in the business environment, yet it continues to face constraints such as high lending rates, limited access to long-term finance, and macroeconomic volatility (Bank of Uganda 2023; Okodoi et al. 2024). As a result, GDP growth stagnated within the low to mid-teens, below the 25–30% range often considered necessary for transformative growth (AfDB 2024; World Bank 2022). The composition of private investment has also been skewed towards services, trade, and real estate, with relatively limited investment in high-productivity manufacturing and export-oriented industries.

Despite the upward trend in these domestic investment indicators, Uganda's economic growth has not been as high, stable, or transformative as policy targets envision. GDP growth has been positive on average but subject to significant fluctuations, and the economy remains heavily dependent on services and subsistence agriculture, with limited industrial diversification. Productivity growth has been modest, job creation has not kept pace with population growth, and poverty reduction has been slower than expected in some regions (MoFPED 2023; World Bank 2023). At the same time, the investment-to-GDP ratio, although higher than in the 1990s, remains below the 30–35% threshold that is often associated with rapid structural transformation in emerging economies (World Bank 2022).

These patterns suggest that while domestic investment in Uganda has increased in volume, its effectiveness in translating into sustained and inclusive economic growth is not fully understood. The coexistence of rising investment and with limited Economic Growth raises concern of quality, and composition, both public and private investment, as well as the macroeconomic environment in which investment takes place. In particular, there is a need to examine how public and private components of domestic investment individually contribute to growth and how monetary policy conditions such as interest rates and exchange rates affect this relationship.

This study therefore situates domestic investment as the key policy variable through which Uganda can address its underlying economic growth problem. By analyzing short-run and long-run, the

study seeks to provide empirical evidence on how changes in domestic investment indicators have influenced economic growth in Uganda, and under what monetary policy conditions investment is most likely to support sustained and transformative growth.

1.2 Problem Statement

Sustaining strong, productive and transformative economic growth is a major challenge for development in Uganda. Economic growth is critical for expanding employment, raising incomes, reducing poverty and facilitating structural transformation. Although Uganda has experienced periods of relatively strong expansion, the pace and quality of growth have not been sufficient to fully address persistent challenges, including low productivity, limited structural transformation, infrastructure deficiencies and inadequate employment opportunities (NPA 2020).

This growth challenge is particularly important given Uganda's substantial efforts to expand domestic investment. PSI rose from approximately 3% of GDP in 2014/15 to 8.1% in FY2023/24 (MoFPED 2023), with major projects such as the Karuma (600 MW) hydropower dam and industrial parks like Namanve intended to expand productive capacity. However, infrastructure gaps persist, productivity and employment gains remain modest, and public debt increased from about 35.3% of GDP in 2015 to 52.4% in FY2024/25, raising concerns about fiscal sustainability (Ida and Ida 2025).

Private investment has also been promoted as a key growth engine, increasing from approximately 11.8% of GDP in 2010 to about 15–16% by 2023–2024 (MoFPED, 2024). Yet its contribution to sustained growth may be constrained by limited access to affordable long-term finance and high interest rates. Private-sector credit stood at about 12.6% of GDP in 2024, while lending rates remained relatively high, increasing the cost of capital and discouraging productive investment.

GFCF increased from 15% of GDP in 1991 to 23.5% in 2021, but remains below the 30 – 35% benchmark associated with investment-led transformation (World Bank 2022). The continued presence of productivity, and employment challenges despite rising investment suggests that the volume of investment alone may not explain Uganda's growth performance; the effectiveness, composition and allocation of investment may be equally important.

The central problem this study addresses is that Uganda continues to face challenges in achieving sufficiently strong, productive, and transformative economic growth despite substantial increases

in domestic investment. It remains unclear whether domestic investment and different effects of monetary conditions to growth.

1.3 Purpose of the Study

The purpose of the study is to determine the relationship between domestic investment and Economic growth in Uganda over the period 1985 – 2023.

1.4 Specific Objectives

- a) To analyze the patterns in Uganda's domestic investment and economic growth.
- b) To examine the effects of domestic investment on economic growth in Uganda.
- c) To determine the moderating effect of monetary policy in the relationship between domestic investment and economic growth in Uganda.

1.5 Research Questions

- 1) What are the patterns of economic growth, domestic investment, and monetary policy in Uganda?
- 2) What are the effects of domestic investment on economic growth in Uganda?
- 3) In what ways does monetary policy moderate the relationship between domestic investment and economic growth in Uganda?

1.6 Research Hypotheses

The following hypotheses were tested in this study

- a) H_{02} : Domestic investment has no significant positive effect on economic growth in Uganda.
- b) H_{03} : Monetary policy does not significantly moderate the relationship between domestic investment and economic growth in Uganda.

1.7 Scope of the Study

1.7.1 Geographical Scope

Geographically confined to Uganda, with emphasis on national-level macroeconomic indicators. The focus on Uganda as a whole was motivated by the fact that Economic Growth and Domestic

Investment are affected by nationwide fiscal, monetary, and structural policies, which operate at the national level.

1.7.2 Content Scope

This study examines the impact of domestic investment on economic growth in Uganda, focusing on the roles of public sector investment (PSI), private sector investment (PrSI), and the moderating effects of monetary policy variables, namely the interest rate (IR) and the exchange rate (EXR).

1.7.3 Time Scope

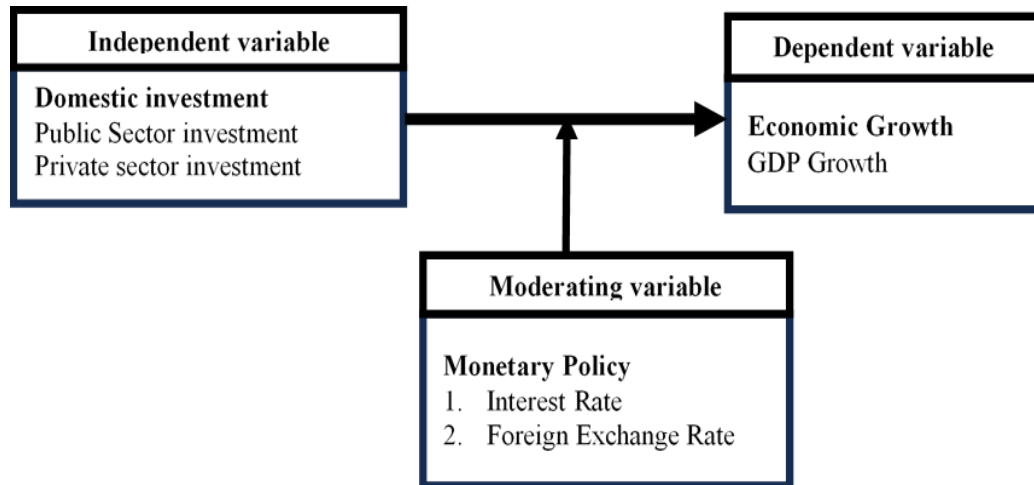
The timeframe selected for this study is 1985 – 2023; this period captures the evolution of Uganda’s domestic investment dynamics within the broader context of its economic transformation journey. This period marks a critical phase in Uganda’s economic history, beginning with the post-1985 recovery era, which was characterized by significant political stabilization and the introduction of market-oriented reforms.

Additionally, the period 1985 – 2023 coincides with the availability of a consistent time-series macroeconomic Dataset for analysis.

1.8 Conceptual Framework

The conceptual framework for this study was developed based on a comprehensive review of theoretical and empirical literature concerning domestic investment, economic growth, and monetary policy. It delineates the hypothesized relationships among the key study variables and provides the analytical lens through which the research was conducted.

Figure 1: Conceptual framework



Source: Adopted from (Raza, Aldeehani, and Alshebami 2020) and modified by the researcher (2025)

The framework positions domestic investment as the independent variable, comprising public and private investment, both of which influence Growth, the dependent variable. Gross Domestic Growth is measured by the GDP growth. The model suggests that the effect of the relationship depends on how efficiently investments are allocated across sectors and supported by effective institutions.

Monetary policy serves as a moderating variable, with interest rate and exchange rate as the variables to moderated the interaction between the dependent and independent variables. It is expected to either enhance or diminish the domestic-growth effect. Specifically, stable interest rates promote private investment and growth, while exchange rate volatility can weaken investment incentives and slow economic performance.

1.9 Significance of the Study

It provides empirical evidence on how domestic investment influences Growth in Uganda within the monetary and macroeconomic stability. By incorporating monetary policy as a moderating factor, it highlights how instruments such as interest rates and exchange rates can either amplify or weaken the investment–growth relationship. The study findings shall guide policymakers in Uganda in designing coordinated fiscal and monetary policies that enhance investment efficiency and accelerate sustainable growth.

Unlike previous research, which has largely focused on foreign direct investment or adopted cross-country comparisons, this study emphasizes the domestic investment–growth nexus specific to Uganda, covering a longitudinal period from 1985 to 2023. This timeframe captures the effects of major economic reforms and policy frameworks, from structural adjustment programs to Vision 2040, thus providing a comprehensive perspective on long-term investment dynamics. The study also enriches academic literature on development economics and enables the researcher to qualify for the award of Master of Science in Economics at Gulu University, showcasing rigorous empirical inquiry into a pivotal driver of Uganda’s economic transformation.

DEFINITION OF KEY TERMS

Domestic Investment

Domestic investment refers to expenditure by residents of a nation on capital goods such as buildings, machinery, and infrastructure that contribute to future production capacity (Dale W. Jorgenson, 1963). It includes all forms of capital formation within a country's borders, financed by domestic savings or credit.

Public Sector Investment

Public sector investment refers to capital expenditure by government and public institutions aimed at developing physical and social infrastructure, for example, education and health facilities, etc., to support the private sector, the productivity of the population, and national welfare (J. M. Keynes 1936).

Private Sector Investment

Private sector investment is defined as expenditure on capital assets by individuals, households, and private enterprises intended to generate future profits (Greene & Villanueva, 1991). It includes investment in manufacturing, agriculture, real estate, and services.

Economic Growth (GDP Growth)

Economic growth represents the sustained increase in a nation's productive capacity and output, measured by the Gross Domestic Product (GDP) (Barro et al. 1992). It reflects improvements in income, employment, and living standards.

Monetary Policy

It refers to the measures taken by a central bank in a given country to regulate money supply, interest rates, and credit conditions to achieve macroeconomic stability (Miskhin 2008). It influences inflation, investment, and growth through transmission mechanisms such as lending rates and exchange rates.

Interest Rates

It is the cost of borrowing money or the return on savings Interest rates (Friedman, 1968), are the cost of borrowing or the return on savings, serving as a key channel of monetary policy transmission (Friedman, 1968).

Exchange Rate

The value of one country's currency to another (Dornbusch, 1976). The exchange rate is the price of one country's currency in terms of another and plays a vital role in determining international competitiveness and investment flows

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The chapter reviews empirical and theoretical literature relevant to the study of domestic investment, economic growth, and monetary policy in Uganda. The review is organized around the study's three specific objectives.

2.1 Theoretical Review: Endogenous Growth Theory

Endogenous Growth Theory provides the primary conceptual lens for this study. The theory states that Economic Growth is driven by the internal mechanisms especially human capital accumulation, investment in physical capital and innovation, rather than external or exogenous technological progress. According to (Romer 1990) purposeful investment in ideas, knowledge, and innovation enhances productivity, while (Lucas Jr 1988) emphasises human capital's spillover effects, where gains in one sector benefit the entire economy.

The theory is especially relevant for developing countries such as Uganda, where strategic investment allocation can generate positive externalities and cumulative learning. Targeted public and private investments in infrastructure, ICT, education and agro-industrial value chains contribute to productivity growth, consistent with the views of (Lopes, Ruddock, and Ribeiro 2002). Public investment, when well-governed, can "crowd in" private investment through complementary infrastructure (Agénor 2006), although poorly executed projects may have the opposite effect (Barro 2003).

However, the theory has limitations in the context of developing countries. It assumes perfect market conditions and rational behavior conditions rarely present in Uganda's investment landscape, which is characterised by policy unpredictability, institutional weaknesses, and high informality. Scholars such as (Acemoglu, Johnson, and Robinson 2005; Rodrik 2002) argue that these structural constraints reduce the productivity of investment and weaken endogenous growth mechanisms. Additionally, inefficient public investments highlighted by (Pritchett 2000a) often lead to low or negative returns. Uganda's investment dynamics are also heavily influenced by financial constraints, technological bottlenecks and an overwhelmingly informal private sector.

Despite its limitations, Endogenous Growth Theory remains foundational for examining how domestic investment interacts with macroeconomic policy to influence long-term growth.

2.2 Patterns in Domestic Investment, Economic Growth and Monetary Policy

In Sub-Saharan African countries, Domestic investment is generally trended upward (Abu and Karim 2016), using panel data since the 1990s, but remain below levels associated with rapid structural transformation. They noted that domestic savings rates are low and volatile, which limits the financing of domestic investment and contributes to fluctuations in capital formation. Similarly, (Adams 2009), analyzing domestic investment in SSA, investments have increased over time but with significant cross-country differences linked to policy reforms, aid flows and external shocks.

Growth patterns (Barro 2003; Barro, Quarterly, and May 2007), using cross-sectional and panel data, have shown that developing countries experience moderate average GDP growth with considerable volatility, especially where investment rates are low and institutions are weak. While these studies do not focus exclusively on Uganda, their findings are consistent with broader African patterns of moderate, volatile growth despite rising investment.

Evidence on monetary policy patterns is more limited in the Uganda-specific journal literature, but related work provides useful insights. (Ndikumana 2005), using international data, found that financial development and structure significantly influence domestic investment, with countries that have deeper financial systems and more stable interest rates experiencing higher and less volatile investment. The exchange rate volatility have a negative relation with productivity growth particularly in developing economies (Aghion et al. 2009), suggesting that unstable exchange rates can undermine the growth benefits of investment.

Studies agree that domestic investment has generally trended upwards in Sub-Saharan Africa since the 1990s, but remains below transformation thresholds. They also agree that growth in developing countries is typically moderate and volatile, and that financial conditions (interest rates, exchange rate stability) influence investment behavior; however, there is less consensus on how to characterise the “quality” of investment over time. Some studies emphasise rising investment rates as evidence of deepening capital accumulation (Abu and Karim 2016; Adams 2009), while others caution that much of the increase may be in low-productivity sectors or public infrastructure with

long gestation periods (Barro 2003; Pritchett 2000b). Methodologically, most studies rely on cross-country panels rather than specific time-series analysis, limiting their ability to capture country-specific patterns in investment, growth, and monetary policy.

2.3 Effect of Domestic Investment on Economic Growth

Several studies have found that Private Investment is stronger and consistent on Growth than Public investment as highlighted below. In Sub-Saharan Africa, using panel data, Private investment contributes significantly to GDP, while Public Investment has a weaker and sometimes insignificant effect (Adams 2009). In relation to the above, the effect of public investment is ambiguous and depends on governance quality and fiscal sustainability (Abu and Karim 2016).

In contrast, some studies highlight public investment's potential to support growth, particularly when directed toward infrastructure. (Agénor 2006) develops a theoretical model of infrastructure-led development, arguing that well-targeted public investment in transport, energy and communications can raise the productivity of private capital and crowd in private investment. However, this positive effect is contingent on efficient project selection and implementation; inefficient public investment can crowd out private activity and reduce growth (Barro 2003; Pritchett 2000a).

Evidence from other developing regions supports the view that domestic investment matters for growth, but that the composition and efficiency of investment are critical. In Malaysia, (Lean and Tan 2011; Mohamed, Singh, and Liew 2013), using time-series and cointegration methods, found that domestic investment contributes positively to GDP, with domestic investment having a more stable long-run effect. In China, domestic investment is a key driver of rapid industrialisation and sustained productivity growth, using time-series and cointegration methods, they found that domestic investment contributes positively to GDP, with domestic investment having a more stable long-run effect (Tang, Selvanathan, and Selvanathan 2008).

In Nigeria, domestic investment has a significant effect on economic growth in both the short and long run (Anthony Ilegbinosa, Micheal, and Ipalibo Watson 2015) and (Ogunjinmi 2022), using OLS and ARDL methods respectively.

In Thailand (Raza et al. 2020), using time-series regression, domestic investment is positively associated GDP and productivity indicators) (Raza et al. 2020), but that the effect is moderated by institutional quality and financial depth.

2.4 Moderating Role of Monetary Policy in the Investment–Growth Relationship

2.4.1 Interest Rate and Investment

Interest rates are a very important determinant in capital accumulation to the private sector in form of credit and Government when borrowing other countries.

Empirical evidence from many scholars supports this relationship. (Meyer and Sanusi 2019), analysing South African economy, his finding confirm that that interest rate movements significantly affect investment and growth, with higher rates associated with lower capital accumulation. (Ghazali 2010), using time-series data for Pakistan, reports a similar negative relationship between interest rates, domestic investment and growth. (Ndikumana 2005) further observes that inefficiencies in financial markets weaken the interest rate transmission mechanism, in some developing countries reducing the role of monetary policy

2.4.2 Exchange Rates and Investment

The exchange rate affects economic growth and investment by influencing import costs, export competitiveness, and investor expectations. Moderate depreciation may stimulate export-led growth by improving external competitiveness, while excessive volatility can discourage private investment due to uncertainty in returns (Aghion et al. 2009).

Empirically, evidence demonstrates that stable exchange rate is vital boosting and economic performance. (Nunnenkamp and Spatz 2005) Domestic investment and foreign investment, especially in developing countries, are attracted to stable exchange rate regimes. (Tang et al. 2008) Observe that exchange rate fluctuations in China influence domestic investment through trade and cost channels. (Bakari and Tiba 2019) report that exchange rate instability significantly reduces investment and growth in Asian developing economies, financial underdevelopment amplifies the negative effects of volatility(Aghion et al. 2009).

Studies agree that unfavorable monetary policy tend to be associated with lower investment and weaker growth.

However, there is little consensus on whether monetary policy moderates the investment–growth relationship in a statistically identifiable way, partly because few studies explicitly model interaction terms between investment and monetary variables. Where moderation is examined (e.g., in Nigeria and Asia), results suggest significant effects, but Sub-Saharan Africa-specific evidence is largely absent.

2.5 Summary of Empirical Literature

Domestic investment (especially private investment) is positively significant with economic growth in Sub-Saharan Africa and other developing regions confirmed by studies conducted by (Abu and Karim 2016; Anthony Ilegbinosa et al. 2015; Lean and Tan 2011; Mohamed et al. 2013; Ogunjinmi 2022; Rodrik 2008). Public investment can support growth, particularly when directed towards infrastructure, but its effects are more context-dependent than those of private investment (Agénor 2006; Barro 2003; Pritchett 2000b).

High interest rates and exchange rate volatility are generally associated with weaker investment and growth outcomes (Aghion et al. 2009; Bakari and Tiba 2019; Ghazali 2010; Meyer and Sanusi 2019). The magnitude and significance of public investment’s effect on growth: some studies find insignificant effects (Abu and Karim 2016; Adams 2009), while others find significant positive effects, especially for infrastructure (Agénor 2006).

Some studies find significant negative effects of Monetary Policy indicators on investment and growth (Chatterjee et al. 2006; Meyer and Sanusi 2019), while others find weaker or context-dependent effects (Ndikumana 2005). The appropriate modelling framework: studies use different methods (OLS, panel fixed effects, cointegration, ARDL, structural models), different data frequencies (annual vs quarterly), and different sample periods, leading to varying conclusions about dynamics and lag structures.

2.6 Empirical Gap

Despite this body of work, important gaps remain, Many Sub-Saharan Africa studies either treat domestic investment as an aggregate variable or focus primarily on FDI, with limited systematic comparison of public vs private investment effects on growth using long time-series and consistent methods (Abu and Karim 2016; Adams 2009).

Few studies explicitly model monetary policy as moderators of the investment–growth relationship. Most include these variables as controls rather than testing whether they alter the investment–growth coefficient (Aghion et al. 2009; Ghazali 2010; Meyer and Sanusi 2019).

While some studies use ARDL or ECM methods to examine the relationships, there is limited consensus on how investment and monetary policy jointly affect growth over different horizons in Sub-Saharan Africa, and no Uganda-specific study using this approach.

This study therefore addresses these gaps by:

Disaggregating domestic investment into PSI and PrSI components, then estimating effects on Economic growth using an ARDL bounds-testing framework, explicitly modelling the interaction terms between domestic investment and monetary policy variables as moderators of the investment–growth relationship. In doing so, the study provides Uganda-specific evidence on how the composition of domestic investment and the monetary environment jointly shape economic growth, thereby informing more targeted investment and macroeconomic policies.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The chapter provides different approaches used in extracting data, cleaning, analysis, and the diagnostic tests for the methods used in the analysis.

3.1 Research Design

The study is purely quantitative, using secondary data extracted over a long period of time from international and national databases. Econometric time series analysis using ARDL was adopted to analyse the relationship between domestic investment and economic growth over the long period identified; the method captures the dynamic interactions between variables irrespective of their order of integration.

This design is particularly suitable for the study because it accommodates small sample sizes and effectively models dynamic adjustments toward long-run equilibrium.

3.2 Study Observations

Using the annual data, the study used 39 observations covering the period 1985–2023. This period was chosen due to availability and the presence of several structural policy transformations in Uganda’s macroeconomic environment, including financial sector reforms and investment liberalization.

3.3 Data Types and Sources

The secondary data used in this study are extracted from reputable national and international sources

- World Development Indicators (WDI, World Bank): GDP, Public and Private Investments.
- Bank of Uganda (BoU): Interest and Exchange Rates

Table 1: Description of Variables

Variable	Symbol	Units	Sources	Expected Sign
GDP Growth	GDPG	(current LCU)	WDI	Dependent variable
Public Sector Investment	PSI	(current LCU)	WDI	Positive
Private Sector Investment	PrSI	(current LCU)	WDI	Positive
Exchange Rate	EXR	Exchange Rate (Sh/US\$) Period Average	BOU	Ambiguous (+/-)
Interest Rate	IR	Lending rate, %	BOU	Negative

3.4 Data Validity and Reliability of the findings

3.4.1 Validity

To ensure validity, both content and construct validity were carefully addressed. Data were sourced exclusively from reputable and internationally recognized institutions as mentioned above, thereby ensuring data authenticity and comparability across the study period. Consistency checks were carried out to verify that all variables Gross Domestic Product, Public and Private Sector Investment, Exchange Rate, and Interest Rate were measured using standardized units and definitions.

3.4.2 Reliability

Reliability was maintained through the application of replicable econometric procedures and rigorous statistical testing using Stata software (version 15). The study tested the stationarity of the data and consistency of the data series. Model reliability was further verified using diagnostic checks for stability of the model.

The use of official macroeconomic data and transparent analytical procedures ensures that the study's results can be independently replicated, thereby confirming its methodological reliability.

3.5 Data Collection Procedures

Process followed clearly defined procedures when extracting data to ensure the consistency, reliability, and validity of the data. These procedures are below.

3.5.1 Identification of Appropriate Macroeconomic Indicators

The key variables (GDP, PSI, PrSI, IR, EXR) were identified and defined based on literature and policy relevance. Interaction terms (e.g., PSI_IR, PrSI_EXR, PSI_EXR, and PrSI_IR) were created to capture moderating effects of monetary policy.

3.5.2 Accessing Relevant Data from Official Sources

Data were obtained from WDI, BoU, UBOS, and MoFPED, ensuring consistency with both international standards and Uganda's national reporting.

3.5.3 Cleaning and Structuring the Dataset

The dataset was cleaned for missing values, outliers, and inconsistencies in measurement units. Where necessary, nominal variables were deflated to real terms, and logarithmic transformations were applied to stabilize variances and normalize distributions.

3.6 Estimation Procedure (Analysis Technique)

The analysis was conducted using Stata software (version 15), All the values were transformed using logarithms: GDP Growth (log_GDP), Public Sector Investment PSI (log_PSI), Private Sector Investment PrSI (log_PrSI), and Exchange Rate EXR (log_EXR), with only the interest rate IR remaining in its level form (percentage). After performing stationarity tests, a linear model was estimated using ARDL to identify the effect of the relationship between domestic investment and economic growth and later monetary policy was introduced to identify the interaction effect on their relationships.

3.6.1 Unit Root Tests

The study performed Unit root tests to determine the stationarity of the data and its order of integration this is very important because it prevents the problem of spurious regression analysis, the study using ADF and confirmed using PP tests, as explained below. The series are integrated of different orders that is, having a combination of I(0) and I(1) series.

The Augmented Dickey-Fuller (ADF) Unit Root Test

The ADF Unit root test using the lagged values of the AP(p) which is an adjustment from the Ordinary Dickey-Fuller Test, the processes of using the equation is as shown below.

$$\Delta Z_t = \beta_0 + \beta_1 + \rho Z_{t-1} + \sum_{i=1}^q \Delta Z_{t-i} + e_t \dots \dots \dots (3.1)$$

The time series to be tested is Z_t , with q as the optimal lags and e_t the white noise error term.

$$H_0: \rho = 0$$

$H_0: \rho < 0$ Implying that there is no unit root and that series are stationary.

The rule of thumb is made from the equation below

$$DF_t = \frac{\hat{\rho} - 1}{Est.std.error(\hat{\rho})} \dots \dots \dots (3.2)$$

If the calculated is less than the test statistic, the null hypothesis is rejected.

Phillips-Perron (PP) Unit Root Test

PP test accounts for autocorrelation in the error terms without adding the lagged values; it is a nonparametric statistical system, using the first-order autoregressive process as shown below

$$\Delta Z_t = \beta_0 + \beta_1 + \beta_1 Z_{t-1} + \rho Z_{t-1} + e_t \dots \dots \dots (3.3)$$

$$H_0: \rho = 0$$

$$H_0: \rho < 0$$

Given that p is greater than zero, there is no unit root and the data is stationary

3.6.2 Lag Length Determination

The optimum lags were selected using the lowest AIC Criterion from the output; according to this the best model has the lower value of the statistic.

3.6.3 Cointegration Test

Since the series are integrated of different orders. That is, a combination of both level-and first – difference stationarity. The study performed cointegration test which is necessary to establish the long-run relationship, the appropriate cointegration test is bounds test proposed by Pesaran, Shin and Smith (2001).

The hypothesis is stated as:

H_0 : no cointegrating equation

H_1 : H_0 is not true

The cointegration test is performed on the level form of the variables and not on the first difference. And in this study, the researcher uses log-transformation of the raw variables.

Decision Criteria for Bounds Test:

The calculated F-statistic for model one is greater than the critical value for the upper bound I(1); cointegration exists, indicating a long-run relationship. Reject the null hypothesis and estimate the long-run model, which is the error correction model (ECM).

3.6.4 The Autoregressive Distributed Lag Model (ARDL)

After determining the lag selection using the AIC Criteria, the study now investigates the long-run relationship since the calculated F-statistic for model one is greater than the critical value for the upper bound I(1).

Estimation of the ARDL Model

Estimating the ARDL–ECM Model for GDP, Public and Private Investment

i. ARDL Model Without Cointegration

The general autoregressive distributed lag model of order (p, q_1, q_2) for gross domestic product (GDP) is specified as:

$$GDP_t = \alpha + \sum_{i=1}^p \phi_i GDP_{t-i} + \sum_{j=0}^{q_1} \beta_j PSI_{t-j} + \sum_{k=0}^{q_2} \gamma_k PrSI_{t-k} + \varepsilon_t \dots \dots \dots (3.4)$$

Where:

GDP_t is real gross domestic product at time t

PSI_t and $PrSI_t$ are Public and private sector investments, respectively

α is a constant term

$\phi_i, \beta_j, \gamma_k$ are coefficients to be estimated

p, q_1 , and q_2 are the optimal lag lengths for GDP, Public Sector investment, and Private Sector Investment; these lag orders are allowed to differ

ε_t is a white-noise error term with zero mean, assumed to be serially uncorrelated (or independent).

In this formulation, current GDP depends on its own past values and on current and past values of public and private investment.

ii. ARDL–ECM Representation with Cointegration

When a cointegrating relationship exists among GDP, public investment, and private investment, the ARDL model can be rewritten in error-correction form:

$$GDP_t = \alpha_0 + \sum_{i=1}^{p-1} \phi_i GDP_{t-i} + \sum_{j=0}^{q_1-1} \delta_j \Delta PSI_{t-j} + \sum_{k=0}^{q_2-1} \pi_k \Delta PrSI_{t-k} + \phi ECT_{t-1} + \varepsilon_t \dots (3.6)$$

where:

Δ denotes the first-difference operator.

ECT_{t-1} is the error-correction term, obtained from the residuals of the estimated long-run cointegrating equation relating GDP to public and private investment.

λ is the speed-of-adjustment coefficient; it is expected to be negative and statistically significant, indicating that deviations from the long-run equilibrium are corrected over time.

ϕ_i, δ_j , and π_k are short-run dynamic coefficients showing how changes in GDP, public investment, and private investment affect the growth rate of GDP in the short run.

The long-run multipliers for public and private investment are derived from the ratios of the level coefficients in the underlying ARDL specification.

This ECM specification allows the model to capture both short-run fluctuations in GDP and the long-run equilibrium relationship with public and private sector investment.

3.7 Diagnostic Tests

To confirm the suitability of the model, the study employed several diagnostics such as multicollinearity, Normality test, and Specifications tests.

3.7.1 Multicollinearity Test

The study employed Variance Inflation Factor (VIF) as expressed in Equation (3.8) below;

$$VIF_i = \frac{1}{1-R_i^2} \dots \dots \dots (3.8)$$

A VIF value equal to or greater than 10 indicates a serious multicollinearity problem that requires corrective action. This issue is often addressed by removing one or more of the highly correlated variables. However, excluding an essential variable from the model may result in making the model invalid.

3.7.2 Heteroscedasticity Test

Heteroscedasticity is the situation where the variance of the regression error is not constant across observations. This violates the assumption of the OLS estimator; the OLS estimator requires constant error variance. In the presence of heteroscedasticity, OLS coefficients remain unbiased but inefficient, and the estimated standard errors are distorted. As a result, the validity of t-statistics and F-statistics may no longer be useful, undermining hypothesis testing.

To examine whether heteroscedasticity is present, the study employed the Breusch–Pagan Lagrange Multiplier (LM) test. The LM test is preferred to the White test for two main reasons. First, the White test sometimes results in misspecification signaling heteroscedasticity rather than non-constant error variance. Second, the white test does not indicate how to correct the problem once the null hypothesis is rejected and may suffer from low power in models with many explanatory variables.

$$H_0 = \text{the error terms are homoscedastic}$$

$$H_1 = \text{the error term is heteroscedastic}$$

If the computed $p < 0.05$, the null hypothesis is rejected, indicating evidence of heteroscedasticity in the model. If the $p > 0.05$, the null hypothesis is not rejected, suggesting that the assumption of constant error variance is satisfied and that the model's error structure is reliable for inference.

3.7.3 Serial Correlation

Autocorrelation comes when the error in one period influences the errors in subsequent periods. The assumptions of independent residuals are violated, which is essential for unbiased and efficient Ordinary Least Squares (OLS) estimations. The model's standard errors become inconsistent, leading to inefficient parameter estimates.

The term follows either an AR or MA, mathematically represented as below;

$$AR(q): \varepsilon_t = \rho_1 \varepsilon_{t-1} + \rho_2 \varepsilon_{t-2} + \dots + \rho_q \varepsilon_{t-q} + \mu_t \dots \dots \dots (3.9)$$

$$MA(p): \varepsilon_t = \rho_1 \mu_t + \rho_2 \varepsilon_{t-1} + \dots + \rho_p \varepsilon_{t-p} \dots \dots \dots (3.10)$$

This study therefore employed the Breusch–Godfrey Lagrange Multiplier (LM) test, which is preferred due to its robustness and flexibility.

3.7.4 Specification Test

To assess the specification of the estimated regression, this study employed the Ramsey Regression RESET test. The test evaluates whether the fitted non-linear transformation values from the original regression provide additional explanatory power for the dependent variable. The reason behind the test is that if such non-linear terms significantly improve the model fit, this may indicate that key variables have been omitted or that the functional form of the model is misspecified.

H₀ the model is correctly specified

H₁ the model is misspecified

When the model is correctly specified, it implies that the coefficients on the added non-linear terms are jointly equal to zero or otherwise.

F-statistic is used to examine the joint significance of the additional terms. A large and statistically significant F-statistic (*p-value* < 0.05) leads to rejection of the null hypothesis, suggesting the presence of specification errors such as omitted variables. Conversely, an insignificant F-statistic (*p-value* > 0.05) indicates that there is no evidence of misspecification, supporting the adequacy of the chosen model specification.

3.7.5 Parameter Stability Test

Ensuring that the estimated parameters remain stable over time is required for the reliability of the relationships. This study applies the CUSUM (Cumulative Sum) and CUSUMSQ (Cumulative Sum of Squares) tests, which are constructed from the residuals obtained from the estimated regression. These diagnostics assess whether the model's coefficients are constant over the sample period or whether they are subject to structural changes.

The CUSUM test is used to detect shifts in the intercept of the regression equation, while the CUSUMSQ test is effective at detecting changes in the coefficients of the slope. The outcomes of

are displayed graphically, with the cumulative sum statistics plotted against critical bounds of the 5% significance level.

$H_0 \leq 0.05$ the parameter of stability is not rejected

H_0 either plot crosses the critical boundaries, the null hypothesis is rejected

3.8 Limitations and Delimitations of the Study

First, the study relies on annual data, which may smooth over important short-run dynamics and cyclical fluctuations in the variables of interest. Second, the analysis is confined to macroeconomic variables and does not incorporate institutional, governance, or political factors that could also influence investment behaviour and economic growth.

The study is delimited to Uganda over the period 1985–2023. This restriction provides a clearly defined temporal framework for facilitating a focused and interpretable relationship between public and private investment and GDP growth in the Ugandan context.

Breusch–Godfrey and VIF Diagnostics fail to pass the test; notably, a significant Breusch–Godfrey result indicates residual serial correlation, while the high mean VIF points to considerable multicollinearity.

3.9 Ethical Considerations

The study relied exclusively on secondary data from official public sources, ensuring confidentiality and avoiding manipulation. All data were cited appropriately following academic integrity principles.

Ethical Considerations

This study relies on secondary macroeconomic data obtained from publicly available sources, such as the World bank and Bank of Uganda these are international and national statistical data bases available. Because no primary data are collected from human or animal subjects, the research does not involve direct interaction with respondents, and issues of informed consent, confidentiality, and physical risk do not arise in the conventional sense; therefore, these are the ethical principles considered:

Data Integrity and Honesty: all data are used in the form provided by the sources, without manipulation designed to favour a particular outcome. Data transformations (e.g., logging) are clearly documented and applied consistently across all variables and time periods.

Transparency of Methods: The econometric specifications, diagnostic tests, and software procedures are described in sufficient detail to allow replication by other researchers. Any limitations arising from data quality, measurement error, or model assumptions are openly discussed.

By sticking to these principles, the study maintained academic integrity, contributed reliably to the existing body of knowledge, and avoided misleading policy conclusions.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.0 Introduction

The chapter presents data presentation, analysis, and interpretation of the study findings for the study variables GDP, PrSI, PSI, IR, and EXR, in the Ugandan context. This chapter starts with descriptive variables to diagnostics tests.

4.1 Descriptive analysis of the variables

Table 2 below shows the summary of the descriptive statistics for Uganda's logarithmic-transformed values of GDP, PSI, PrSI, and EXR, with only IR with is in its natural percentage form, namely Gross Domestic Product (log_GDP), Public Sector Investment (log_PSI), Private Sector Investment (log_PrSI), Exchange Rate (log_EXR), and Interest Rate (IR).

Table 2: Summary statistics

	Mean	max	min	Std. Dev.	skewness	kurtosis
Log_gdp	31.529	32.573	30.404	.714	-.093	1.668
Log_psi	27.128	30.029	20.229	2.333	-1.165	4.308
Log_prsi	28.09	30.998	20.672	2.715	-1.043	3.489
Log_EXR	7.051	8.223	1.905	1.479	-2.147	7.091
IR	23.757	40	18.2025	6.359033	1.506063	3.846588

Source: Author's computation (Stata 15, 2025).

Gross Domestic Product (log_GDP)

The table 2 above shows that the average log_GDP IS 31.529 with the highest and lowest values 32.573 and 31.529 respectively, the analysis also show that the standard deviation is 0.714 showing low dispersion which suggest that Economic growth has remained stable of the period analyzed, the GDP distribution symmetrical with the skewness value of – 0.093 and the kurtosis is platykurtic with the value 1.668, this means that the dataset is flatter than a normal curve. This pattern reflects a consistent but gradual growth trajectory in the economy, with limited occurrence of extreme deviations.

Public Sector Investment (log_PSI)

With an average of 27.128, with the highest and lowest values 30.029 and 20.229, respectively, the analysis also shows that the standard deviation is 2.333, with a negative skewness of -1.165 , showing that most values are concentrated towards the end of the scale, implying increased public investment in the later years of the study period with leptokurtic kurtosis with a value of 4.308. This pattern reflects a consistent but gradual growth trajectory in the economy, with limited occurrence of extreme deviations, implying increased public investment in the later years of the study period pointing to periods of intense government investment activities possibly associated with infrastructure expansion and fiscal stimulus interventions.

Private Sector Investment (log_PrSI)

With a mean value of 28.090, and lowest and highest values being 20.672 and 30.998 respectively, a standard deviation of 2.715, indicating greater variability compared to public investment. The negative skewness value (-1.043) suggests that private investment was relatively higher in the more recent years, likely reflecting the positive effects of market liberalization and private sector-led growth policies. The kurtosis value of 3.489, slightly above the normal benchmark, implies the existence of sporadic peaks in private investment, which may have been influenced by favorable business conditions or government incentives.

Exchange Rate (log_EXR)

At an average of 7.051, and lowest value and highest value 1.905 and 8.223 respectively, with 1.479 as the standard deviation, indicating substantial volatility within the period of the study. The skewness of -2.147 and kurtosis, which is high at 7.091 that extreme exchange rate movements occurred, characterized by periods of rapid currency depreciation.

Interest Rate (IR)

Measured in percentage terms, records a mean value of 23.757%, ranging between 18.2025% and 40%, 6.359 as the standard deviation and skewness of 1.506 shows that higher interest rate episodes were infrequent but significant, while the kurtosis value (3.846) suggests a leptokurtic distribution, reflecting occasional spikes in monetary policy rates. The relatively wide dispersion

in interest rates points to fluctuations in monetary policy stance, which likely influenced both public and private investment decisions during the period under review.

In summary, the descriptive statistics reveal that while GDP, public investment, and private investment generally exhibited upward trends with moderate variability, the exchange rate and interest rate displayed higher volatility, indicating the presence of macroeconomic instability during certain periods.

4.2 Analysis of Correlation

The analysis was to examine the linear relationships between the independent variables of the study and to identify multicollinearity issues that could impact regression model estimates. The analysis from Stata output is shown below in Table 3.

Table 3: Pairwise Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)
(1) log_gdp	1.000				
(2) log_psi	0.918 (0.0000)	1.000			
(3) log_prsi	0.939 (0.000)	0.989 (0.000)	1.000		
(4) log_EXR	0.788 (0.000)	0.959 (0.000)	0.944 (0.000)	1.000	
(5) ir	-0.656 (0.000)	-0.608 (0.000)	-0.660 (0.000)	-0.583 (0.000)	1.000

Source: Author's computation (Stata 15, 2025)

The correlation results indicate strong and statistically significant positive relationships between economic growth (log_gdp) and log_psi, log_prsi, and log_EXR, with coefficients of 0.918, 0.939, and 0.788, respectively. The interest rate (ir) has a negative and statistically significant correlation with all variables, with coefficients from - 0.583 to - 0.660. The high correlations among log_psi, log_prsi, and log_EXR, particularly the 0.989 correlation between log_psi and log_prsi, indicate a potential multicollinearity problem.

4.3 Unit Root Testing Process

The study used two-unit root testing process by starting with the ADF then a confirmatory test using Phillips-Perron

Table 4: ADF and Phillips-Perron Unit Root Tests

Variables	Augmented Dickey-Fuller Test			Phillips Perron Test		
	Levels	First Difference	Order of Integration	Levels	First Difference	Order of Integration
log_GDP	-0.105 (0.9930)	-5.435 (0.0000)	I(1)	-0.940 (0.9517)	-7.872 (0.0000)	I(1)
log_PSI	-6.941 (0.0000)		I(0)	-6.091 (0.0000)		I(0)
log_PrSI	-4.850 (0.0004)		I(0)	-5.394 (0.0000)		I(0)
log_EXR	-7.502 (0.0000)		I(0)	-7.330 (0.0000)		I(0)
IR	-2.013 (0.5943)	-4.695 (0.0007)	I(1)	-2.605 (0.2774)	-6.915 (0.0000)	I(1)

Source: Author's computation (Stata 15, 2025).

The variable (log_GDP) not stationary in its level form, which was also confirmed by the PP test of -0.940 with a p-value of 0.9517. However, the first differences of log GDP yielded strongly significant results (ADF = -5.435, $p = 0.0000$; PP = -7.872, $p = 0.0000$), confirming that log_GDP is of order I(1)

log_PSI, log_PrSI, and log_EXR are stationary in levels and significantly below the 5% critical values for log_PSI (ADF = -6.941, PP = -6.091), log_PrSI (ADF = -4.850, PP = -5.394), and (ADF -7.502, PP = -7.33). This suggests these investment variables are I(0).

IR is also not stationary in levels and not significant at 5% (ADF = -2.013, PP = -2.605), after first difference (ADF = -4.695, PP = -6.915) both significant at 5% level. This indicates that Interest rate of integrated of order I(1).

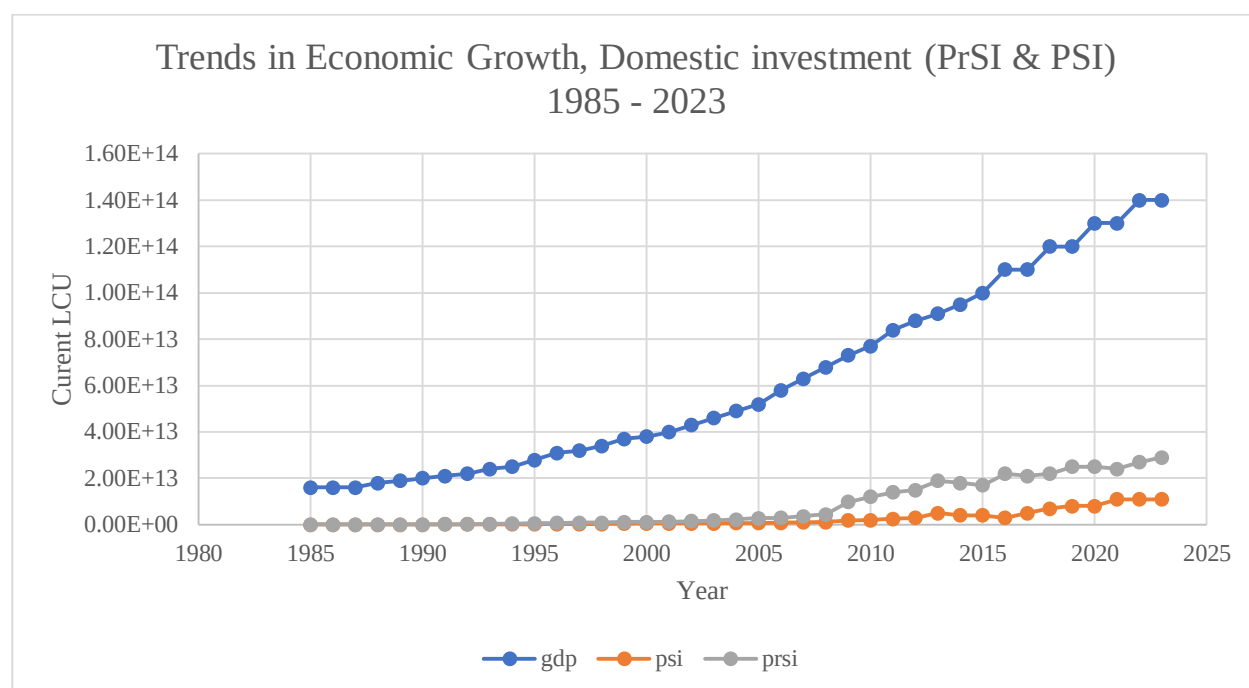
With the mixed order of integration of being I(0) and I(1) variables, the ARDL bound testing approach is suitable for examining the long run relationships among the study variables.

Given the mixed order of integration, with some variables being I(0) and others being I(1), and the absence of I(2) variables, the Autoregressive Distributed Lag (ARDL) bound test approach to

4.4 Patterns and Trends in Domestic Investment and Economic Growth

The graphical analysis provides an initial descriptive assessment of the evolution of economic growth and domestic investment in Uganda between 1985 and 2023. The analysis distinguishes domestic investment into public-sector investment (PSI) and private-sector investment (PrSI), allowing the study to establish whether these components followed similar or different patterns over time. The graphical evidence is descriptive and does not by itself establish causality; rather, it provides an overview of the movements that are subsequently examined using the econometric analysis.

Figure 2: Trends in Economic Growth, Domestic investment (PrSI & PSI)



Source: Author's computation (Excel office 2016)

Economic Growth

The GDP series shows a clear long-term upward trend over the study period. GDP increased from approximately UGX 16 trillion in 1985 to UGX 140 trillion in 2023, representing substantial expansion in the size of the Ugandan Economic Growth. The increase, however, was not uniform throughout the period.

During the late 1980s and 1990s, GDP increased gradually, rising from about UGX 16 trillion in 1985 to approximately UGX 37 trillion by 1999. The upward movement became more pronounced during the 2000s, with GDP increasing from about UGX 38 trillion in 2000 to UGX 73 trillion in 2009. This pattern continued during the 2010s, reaching approximately UGX 100 trillion in 2015 and UGX 120 trillion by 2018–2020. By 2022–2023, GDP had reached approximately UGX 140 trillion.

The year-to-year data also indicate that economic expansion was not completely smooth. For example, GDP remained around UGX 16 trillion between 1985 and 1987 and around UGX 110 trillion in 2016 – 2017, before increasing further. The calculated annual percentage changes in the dataset indicate an average year-on-year increase of approximately 5.9%, although the growth rate varied considerably across years. This suggests that Uganda experienced sustained long-term economic expansion, but the pace of expansion fluctuated over time.

A particularly important observation for this study is that the upward movement in GDP occurred alongside substantial increases in both public and private investment. This provides descriptive evidence of a co-movement between capital formation and economic expansion, although such co-movement cannot be an evidence that investment caused GDP. The direction and magnitude of that relationship require econometric testing.

Public-Sector Investment

The trend in public-sector investment shows a substantial increase over the study period, although the series is considerably more volatile than GDP. PSI increased from approximately UGX 610 million in 1985 to UGX 11 trillion in 2023.

The most pronounced increase occurred from the late 1980s into the early 1990s. PSI increased from approximately UGX 610 million in 1985 to UGX 140 billion in 1991 and UGX 260 billion by 1993. However, the series subsequently showed periods of stagnation and fluctuation. For example, PSI remained around UGX 240 billion in 1994–1995 before increasing again toward the end of the 1990s.

A more sustained increase occurred from the 2000s onwards. PSI rose from approximately UGX 570 billion in 2000 to UGX 1.1 trillion in 2008, before increasing sharply to approximately UGX 1.9 trillion in 2009 and UGX 3 trillion in 2012. The series subsequently became more volatile,

increasing to UGX 5 trillion in 2013, falling to approximately UGX 3 trillion in 2016, and then rising again to UGX 11 trillion by 2021–2023.

This pattern suggests that public investment expanded substantially over the study period but was characterised by periods of acceleration, contraction and renewed expansion. Unlike GDP, which displays a relatively smooth upward trajectory, PSI exhibits much greater fluctuations. This difference is important because the economic effects of public investment may depend also on its efficiency of expenditure.

Private-Sector Investment

Private-sector investment also demonstrates a strong long-term upward trend, increasing from approximately UGX 950 million in 1985 to UGX 29 trillion in 2023. The increase was particularly pronounced from the 1990s onwards.

PrSI rose from approximately UGX 140 billion in 1991 to UGX 630 billion in 1995 and UGX 1.2 trillion by 2000. It continued to increase during the 2000s, reaching approximately UGX 3 trillion in 2006, UGX 4.5 trillion in 2008 and UGX 9.9 trillion in 2009. The series then continued to expand, reaching approximately UGX 15 trillion in 2012 and UGX 19 trillion in 2013.

However, unlike the consistently increasing GDP series, private investment experienced several periods of decline. It fell from approximately UGX 19 trillion in 2013 to UGX 17 trillion in 2015, before recovering to UGX 22 trillion in 2016–2018 and increasing further to UGX 29 trillion in 2023.

The pattern therefore indicates that private investment has generally expanded alongside economic growth, but its trajectory has been more responsive to changing economic conditions than GDP. This may suggest that private investment is sensitive to the investment environment and other macroeconomic conditions.

Comparison Across Periods

The dataset also revealed an interesting change in the pace of expansion across different periods.

Table 5: Compound Annual Growth Rate.

Period	GDP CAGR	PSI CAGR	PrSI CAGR
1985–1994	5.10%	94.20%	95.70%
1995–2004	6.40%	13.70%	15.50%
2005–2014	6.90%	19.60%	23.00%
2015–2023	4.30%	13.50%	6.90%

Source: Author’s computation (Excel office 2016)

During 2005–2014, GDP recorded its strongest compound annual expansion in the dataset, approximately 6.9%, while PSI grew by approximately 19.6% annually and PrSI by approximately 23.0%. This period therefore represents a period of relatively strong simultaneous expansion in economic activity and domestic investment.

However, during 2015 – 2023, GDP growth in the dataset slowed to approximately 4.3% annually, despite continued expansion in PSI and PrSI. PSI increased at approximately 13.5% annually, while PrSI increased by approximately 6.9%.

4.5 Estimation of the ARDL Model

With the integration of I(0) and I(1), ARDL-ECM approach for cointegration test is suitable for examining the existence of long run relationship as shown in Table 5.

4.5.1 Optimal Selection of Lags

Table 6: Lag length selection

Selection-order criteria

Sample: 1989 - 2023

Number of obs = 35

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-44.916	0.003	2.738	2.784	2.871			
1	115.601	321.030	9	0.000	5.4e-07*	-5.92008*	-5.736*	-5.38682*
2	124.292	17.38*	9	0.043	0.000	-5.902	-5.580	-4.969
3	128.205	7.828	9	0.552	0.000	-5.612	-5.152	-4.279
4	131.536	6.661	9	0.672	0.000	-5.288	-4.689	-3.555

Endogenous: log_gdp log_psi log_prsi

Exogenous: _cons

Source: Author's computation (Stata 15)

The optimal lag selection for the ARDL model was determined using VAR lag-order criteria (FPE, AIC, HQIC, SBIC), all of which selected lag 1 as the best system lag, as shown in above. Lags for Variables were identified as show in table 7 below

Table 7: Autoregressive Distributed Lag model

ARDL(1,0,1) regression

Sample: 1986 - 2023

Number of obs = 38

F(4, 33) = 5502.69

Prob > F = 0.0000

R-squared = 0.9985

Adj R-squared = 0.9983

Log likelihood = 83.780715

Root MSE = 0.0286

log_gdp	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
log_gdp						
L1.	0.916	0.021	42.650	0.000	0.873	0.960
log_psi	-0.016	0.014	-1.110	0.275	-0.044	0.013
log_prsi						
--.	0.087	0.031	2.830	0.008	0.024	0.149
L1.	-0.046	0.025	-1.860	0.071	-0.096	0.004
_cons	1.962	0.505	3.890	0.000	0.935	2.990

Source: Author's computation (Stata 15)

The Stata-based AIC criterion automatically selected ARDL (1, 0, 1), with the estimated sample reduced to 38 observations due to lags differences. With this specification, means 1 lag for GDP, 0 lags for PSI, and 1 lag for PrSI. This model is appropriate because it captures the dynamics efficiently without over fitting, and the lag significance patterns support the chosen structure.

4.5.2 Cointegration Analysis

The ARDL bound test was conducted to determine the presents of both long run and short run relationships among GDP, PSI, and PrSI.

Table 8: ARDL Bound Test results

ARDL(1,0,1) regression

Sample: 1986 - 2023

Number of obs = 38

R-squared = 0.3472

Adj R-squared = 0.2681

Log likelihood = 83.780715

Root MSE = 0.0286

D.log_gdp	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
ADJ						
log_gdp						
L1.	-0.084	0.021	-3.900	0.000	-0.127	-0.040
LR						
log_psi	-0.188	0.176	-1.070	0.294	-0.545	0.170
log_prsi						
--.	0.485	0.150	3.230	0.003	0.179	0.792
SR						
log_prsi						
D1.	0.046	0.025	1.860	0.071	-0.004	0.096
_cons	1.962	0.505	3.890	0.000	0.935	2.990

note: estat btest has been superseded by estat ectest
as the prime procedure to test for a levels relationship.

Pesaran/Shin/Smith (2001) ARDL Bounds Test

H0: no levels relationship F = 5.781

t = -3.899

Critical Values (0.1-0.01), F-statistic, Case 3

Source: Author's computation (Stata 15)

The Bound testing results reports that F – statistics is equal to 5.781 and -3.899 for t-statistics under Case 3. For a model with k – 2 repressors in the long-run equation with the reduced observation to 38 due to lag observation as significant at 5% level.

Since the calculated F-statistic is greater than the Upper bound, resulting in the rejection of the null hypothesis of no long-run relationship is rejected. With t-statistics at 5%, critical values range from –2.86 (I0) to –3.53 (I1). The calculated t-statistic (–3.899) I(1) critical value is less than the

I(0) critical value, again supporting rejection of the null. Together, these results confirm there is a significant long-run cointegration among GDP, public investment, and private investment. The significance of the adjustment term in the ARDL Error Correction Model (ECM) further reinforces this conclusion. The error-correction coefficient is -0.0838 ($p < 0.001$), correctly signed and statistically significant; the long-run disequilibrium is corrected each year at 8.4%, and implies that there is a slow adjustment following short-run shocks.

4.5.3 Model Specification

The model specification is in two parts, that is to say, the long-run relationship and short-run relationship, and is specified using the actual coefficients obtained from the analysis as shown below.

i. Levels Long-Run ARDL Model Specification

$$GDP_t = 1.9624 + 0.9162GDP_{t-1} - 0.00157PSI_t + 0.0867\log_PrSI_t - 0.0461PrSI_{t-1} + \varepsilon_t$$

Where each coefficient corresponds exactly to the Stata output:

Intercept: 1.9624

Lagged (GDP_{t-1}): 0.9162

Public Investment (PSI): -0.0157

Private Investment ($PrSI$): 0.0867

Lagged $PrSI_{t-1}$: -0.0461

ii. Short-Run Dynamics

Error Correction Model specification

$$\Delta GDP_t = -0.0838ECT_{t-1} + 0.0461\Delta PrSI_t + 1.9624 + \mu_t$$

Where:

Error Correction Term ($-0.0838ECT_{t-1}$) coefficient = $-0.0838 \rightarrow$ indicates an 8.38% adjustment back to equilibrium annually.

Short-run change in private investment ($\Delta PrSI$): 0.0461

Constant term: 1.9624, and Public investment does not appear in the short-run dynamics because of zero lag.

The ARDL error-correction results indicate that the coefficient is -0.0838 and is statistically significant at the 1% level. The negative sign confirms the model contains a stable long-run adjustment mechanism. It also suggests that about 8.4% of any disequilibrium in the short-term is eliminated annually, showing that the economy returns to its long-run equilibrium gradually.

Private investment has a positive coefficient of 0.0461 and is marginally significant at the 10% level ($p = 0.071$). This finding indicates that differences in private investment have no effect on GDP in the short run and have been excluded in the short-run terms because the lag-selection procedure assigned it a zero lag, meaning that its immediate short-run effect is not estimated in the model.

i. Long-Run Coefficients

Long-Run Model specification

Public Investment (PSI): -0.1876

Private Investment ($PrSI$): 0.4855

Thus, the long-run relationship is:

$$GDP_t = -0.1876PSI_t + 0.4855PrSI_t + ECT_{t-1}$$

The ARDL model in the long run shows that public and private investment have effects on GDP. Public investment is negative with a coefficient of -0.1876 , but statistically insignificant ($p = 0.294$). Therefore, the results do not provide sufficient evidence that public investment has a meaningful long-run influence on GDP during the study period. The negative effect may be associated with inefficiencies in public-sector spending, delays in project implementation, or the possibility that the economic benefits of public investment take longer to materialize than the period covered by the study.

Private investment demonstrates a positive and statistically significant coefficient of 0.4855 ($p = 0.003$). This result implies that a 1% increase in private investment leads to approximately a

0.49% increase in GDP in the long run. The finding highlights the important contribution of private-sector investment to sustained economic growth.

Model Fit

The ARDL model demonstrates a very strong fit in its levels form, with an R^2 of 0.9985 and an adjusted R^2 of 0.9983. These statistics indicate that about 99.85% of the variation in GDP is explained by the variables included in the model, since the model may partly reflect common trends over time. The presence of cointegration supports the use of the levels equation for interpreting the long-run relationship.

The model is statistically significant. Supported by the F-statistic of 5502.62, which is significant at the 1% level ($p < 0.01$). Therefore, the null hypothesis that the explanatory variables have no joint effect on GDP is rejected.

4.6 Diagnostic Tests

Several diagnostic tests were conducted to assess the validity and statistical adequacy of the estimated ARDL model. The results confirm that the model satisfies most of the assumptions of classical regression analysis. A detailed explanation of each diagnostic test is presented in Table 9 below, using the results generated from the ARDL model

Table 9: Diagnostic Test Results

Diagnostic Test	Statistic / Value	p-Value
Durbin–Watson Statistic	2.8129	—
Breusch–Godfrey LM	$\chi^2 = 7.012$	0.0081
Heteroskedasticity Tests	$\chi^2 = 20.11$	0.1266
ARCH LM Test	$\chi^2 = 0.791$	0.3738
Ramsey RESET	F = 0.38	0.7675
Multicollinearity Test (VIF)	Mean VIF = 45.16	—
Stability Test	Stable	Stable

Source: Author’s computation (Stata 15, 2025).

The diagnostic tests provide mixed but generally supportive evidence for the suitability of the ARDL model. The Breusch–Godfrey LM test rejects the null hypothesis of no serial correlation

($\chi^2=7.012$, $p = 0.0081$), indicating first-order autocorrelation in the residuals. Durbin–Watson statistic is 2.8129, suggesting that the autocorrelation may not be severe, the significant LM test result should not be disregarded. It may indicate that the model could benefit from additional lag terms or an alternative specification.

The ARCH LM test did not detect conditional heteroskedasticity ($\chi^2 = 0.791$, $p = 0.3738$). and the White’s test fails to reject the null hypothesis of constant error variance ($\chi^2 = 20.11$, $p = 0.1266$). The findings suggest that the residual variance is stable over the study period. The evidence of no ARCH effects further supports the conclusion that volatility clustering is not a major concern in the model.

The Ramsey RESET test cannot reject the null hypothesis of correct functional form specification, which is statistically insignificant ($F = 0.38$, $p = 0.7675$). This result indicates that there is no strong evidence of misspecification in the estimated ARDL model.

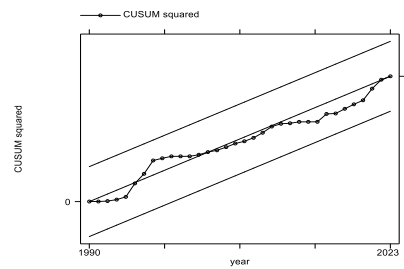
Multicollinearity and stability

The model records a very high mean variance VIF of 45.16, indicating multicollinearity among the explanatory variables. In an ARDL framework, this may result from the inclusion of current and lagged values of related variables, which are often highly correlated. Given these results, interpret the individual coefficient estimates with caution, even though the model may still provide useful information about the variables’ joint effects on long-run relationships.

Finally, the CUSUM and CUSUMSQ tests show that the model’s parameters remain stable throughout the sample period within 5% critical boundaries. As shown in Figure 6, both trajectories remain within the 5% critical boundaries. This provides evidence against structural breaks and supports the stability of the estimated short-run and long-run relationships.

Overall, the model appears correctly specified, homoscedastic, and structurally stable. However, the significant Breusch–Godfrey result indicates residual serial correlation, while the high mean VIF points to considerable multicollinearity. These two issues should be acknowledged as limitations when interpreting the model’s reliability.

Figure 3: CUSUM and CUSUMSQ plots



Source: Author's computation (Stata 15, 2025).

4.7 Moderating Role of Monetary Policy

To determine whether monetary policy conditions interact with domestic investment in affecting the relationship with Economic Growth, I different ARDL models have been conduction one with Private sector and the other with Public sector.

Private sector investment

ARDL(2,1,0,0) regression

Sample: 1987 - 2023

Number of obs = 37

R-squared = 0.4497

Adj R-squared = 0.3396

Log likelihood = 85.799471

Root MSE = 0.0264

D.log_gdp	Coef.	Std. Err.	t	P>t	[95%Con f.	Interval]
ADJ						
log_gdp						
L1.	-0.107	0.037	-2.890	0.007	-0.183	-0.031
LR						
log_prsi	0.286	0.212	1.340	0.189	-0.148	0.719
Prsi_EXR	0.027	0.039	0.690	0.496	-0.053	0.108
PSI_EXR	-0.027	0.031	-0.880	0.388	-0.091	0.037
SR						
log_gdp						
LD.	-0.425	0.146	-2.910	0.007	-0.724	-0.126
log_prsi						
D1.	0.039	0.029	1.340	0.191	-0.020	0.098
_cons	2.573	0.643	4.000	0.000	1.260	3.885

Source: Author's computation (Stata 15, 2026).

The private-sector investment on GDP Growth model was estimated using 37 observations because of differences in the selected lag structures. With an F-statistic of 5.501, higher than the 5% upper-bound critical value of 4.35. Additionally, the t-statistic of -3.974 greater the corresponding 5% upper-bound critical value of -3.78 . the lead to a rejection of the null hypothesis that no long-run relationship exists; the interaction between Private investment and monetary policy has a long-run relationship with Economic Growth. The estimated long-run coefficient of private-sector investment is statistically significant and positive, with a value of 0.3971 p-value of 0.001. The result highlights that higher private-sector investment is associated with increased economic growth in the long run. However, PrSI_IR was negative but statistically insignificant, with a coefficient of -0.0005 and a p-value of 0.206. Likewise, the PrSI_EXR had a negative but insignificant coefficient of -0.0044 , with a p-value of 0.523. The results do not offer adequate evidence that monetary policy conditions significantly influence the long-run effect of private-sector investment on economic growth. ECM was negatively statistically significant, with a coefficient of -0.1223 and a p-value below 0.001. This confirms that short-run deviations are gradually corrected as the model returns to its long-run equilibrium. With a low speed of convergence adjustment approximately 12.2% of any disequilibrium is adjusted within one period.

Public Sector Investment

ARDL(2,0,0,0) regression

Sample: 1987 - 2023

Number of obs = 37

R-squared = 0.2312

Adj R-squared = 0.1072

Log likelihood = 79.614171

Root MSE = 0.0307

D.log_gdp	Coef.	Std. Err.	t	P>t	[95%Conf.	Interval]
ADJ						
log_gdp						
L1.	-0.037	0.036	-1.010	0.319	-0.111	0.037
LR						
log_psi	-0.037	0.884	-0.040	0.967	-1.839	1.765
PSI_IR	-0.002	0.002	-0.960	0.343	-0.006	0.002
PSI_EXR	0.013	0.038	0.330	0.741	-0.065	0.091
SR						
log_gdp						
LD.	-0.318	0.163	-1.950	0.060	-0.649	0.014
_cons	1.227	0.629	1.950	0.060	-0.056	2.510

Source: Author's computation (Stata 15, 2026).

The lag selection reduced the effective sample from 39 observations to 38 observations because of differences in the lag structures. public-sector investment and economic growth model, the F-statistic of 2.149 and the lower bound of 2.72 which are below the 10% critical value with t-statistic of -0.860 also did not meet the required critical thresholds. Leading to no rejection of null hypothesis of no long run relationship. The estimated long-run coefficients for public-sector investment and its interactions with monetary-policy variables should not be interpreted as evidence of persistent long-run effects.

CHAPTER FIVE

DISCUSSIONS

5.0 Discussion of Findings

5.0 Introduction

The chapter discusses the empirical findings according to the three different objectives of the study, comparing and analyzing findings from different scholars in different countries.

5.1 Trends in Domestic Investment and Economic Growth

The findings show that Uganda has experienced sustained but uneven trends in Economic Growth and Domestic Investment over the period 1985–2023. Descriptive statistics and graphical analysis in Chapter Four show that GDP expanded from approximately UGX 16 trillion in 1985 to UGX 140 trillion in 2023, representing substantial long-term growth, albeit with distinct phases of acceleration and deceleration. The compound annual growth rates varied across sub-periods: 5.10% (1985–1994), 6.40% (1995–2004), 6.90% (2005–2014), and 4.30% (2015–2023), indicating that the pace of expansion has not been uniform.

Private sector investment (PrSI) has shown a consistent upward trajectory, particularly following the economic liberalization reforms of the 1990s, which promoted market-oriented policies and private sector participation. The data reveal that PrSI increased from approximately UGX 950 million in 1985 to UGX 29 trillion in 2023, with especially rapid growth in the early reform period (95.70% CAGR in 1985–1994) and the 2000s investment boom (23.00% CAGR in 2005–2014). This trend reflects Uganda's shift toward a private-sector-led growth model and aligns with the endogenous growth perspective that emphasizes private capital accumulation as a driver of sustained expansion (Lucas Jr 1988; Romer 1990).

Public sector investment (PSI) has also increased over time, rising from approximately UGX 610 million in 1985 to UGX 11 trillion in 2023, largely driven by government expenditure on infrastructure and development projects, particularly under the National Development Plans in the 2000s and 2010s. However, its growth has been less consistent and often influenced by fiscal constraints, governance challenges, and political cycles. The PSI series exhibits higher volatility

than GDP, with distinct phases of rapid expansion (e.g., 94.20% CAGR in 1985–1994, 19.60% in 2005–2014) interspersed with periods of stagnation or contraction (e.g., around 2016). The pattern is consistent in many developing countries, where donor flows, debt sustainability concerns, and procurement bottlenecks drive spending volatility.

Monetary policy indicators, particularly in this study, have exhibited significant volatility over the study period. The interest rate (IR) ranged between 18.2% and 40%, with a mean of 23.76% and positive skewness (1.506), indicating occasional spikes in monetary policy rates, likely in response to inflation surges and external shocks. The exchange rate (log_EXR) displayed substantial volatility, with a wide range (1.905–8.223 in logs), pronounced negative skewness (−2.147), and very high kurtosis (7.091), reflecting episodes of sharp currency depreciation, external sector pressures, and balance-of-payments challenges. These patterns indicate that Uganda's financial environment has been characterized by high and fluctuating interest rates and exchange rate instability, reflecting Government efforts through the Central Bank towards controlling inflation and stabilize the economy against external shocks.

These findings are consistent with (Nagawa, Wasswa, and Bbaale 2020), who highlight that macroeconomic instability and low domestic savings continue to constrain investment and growth in Uganda. Likewise, Unstable macroeconomic conditions in Sub-Saharan Africa limit the effectiveness of investment in driving growth (Victor and Bridget 2019). The high volatility of monetary policy variables, combined with the pro-cyclical nature of private investment, suggests that Uganda's growth trajectory has been sensitive to both domestic policy responses and external shocks.

Conclusively, the analysis of trends shows that while Uganda has made progress in increasing investment and growth, macroeconomic instability and structural constraints remain key challenges. The co-movement between investment and growth, supported by very high pairwise correlations (log_GDP with log_PrSI = 0.939; log_GDP with log_PSI = 0.918), indicates that capital formation and economic activity have moved together over time, but the direction and magnitude of causal effects require econometric testing.

5.2 Effect of Domestic Investment on Economic Growth

Private sector investment was found to have a positive and statistically significant effect on long-run economic growth. The long-run coefficient on $\log_PrSI$ was 0.4855 ($p = 0.003$), while in the private investment model with interaction terms 0.3971 ($p = 0.001$). This means that a 1% increase in private investment leads to a range of between 0.4% and 0.49% increase in GDP in the long run. The result is consistent with the Endogenous Growth Theory, which emphasizes that private investment enhances productivity, innovation, and long-term economic expansion through capital accumulation and technology adoption (Lucas Jr 1988; Romer 1990).

Empirically, Private investment significantly contributes to economic growth in developing countries (Abu and Karim 2016), (Lean and Tan 2011), (Mohamed et al. 2013), and (Tang et al. 2008). The strong performance of private investment in Uganda reflects the impact of liberalization policies that have encouraged entrepreneurship, efficiency, and market-driven resource allocation. The descriptive evidence showed that the highest growth period (2005–2014, with GDP CAGR $\approx 6.9\%$) coincided with the fastest private investment expansion (23.00% CAGR), supporting the view that private capital formation has been a key driver of Uganda's Economic growth.

However, private investment in the short run has modest effects and is sometimes only marginally significant. In the ARDL ECM, the coefficient on $\Delta\log_PrSI$ was approximately 0.0461 ($p = 0.071$), suggesting that short-run fluctuations in private investment have a smaller and less immediate impact on GDP growth. Given investment gestation periods, adjustment costs, and structural rigidities within the economy (e.g., infrastructure bottlenecks, financial market frictions). The ECT of approximately -0.08 to -0.12 , with $p < 0.01$, indicates that any deviation from the long-run equilibrium is corrected each year by about 8 – 12%, implying a gradual adjustment process with a half-life of approximately 6 – 9 years.

Public sector investment was negatively and statistically insignificant on growth in the long run. In the ARDL (1,0,1) model, the long-run coefficient on $\log_PSI$ was approximately -0.1876 ($p = 0.294$), while in the combined model with interaction terms, it was approximately -4.4743 ($p = 0.486$), though the latter specification failed the bounds test. This finding raises concerns about public investment efficiency and productivity in Uganda.

While economic theory suggests that public investment should promote growth through infrastructure development and provision of public goods (Agénor 2006), the results support findings that public investment in developing countries is often undermined by inefficiencies, corruption, and poor project execution (Raza et al. 2020; Ribeiro and Teixeira 2001). In Uganda, challenges such as procurement inefficiencies, weak monitoring systems, cost overruns, and misallocation of resources may limit the growth-enhancing effects of public investment. The descriptive evidence shows that PSI has been highly volatile, with sharp expansions and contractions that may reflect political cycles and donor dependency rather than strategic, productivity-enhancing allocation.

This implies Public investment effectiveness depends not only on quantity but quality. The high correlation between PSI and PrSI (0.989) suggests complementarity, but the direct growth effect of PSI is weak from the econometric analysis. Public investment may exert its influence indirectly by crowding-in private investment through improved infrastructure (power, transport, ICT), enhancing total factor productivity by reducing transaction costs, or providing social infrastructure (education, health) that improves human capital over longer horizons. However, these indirect effects are not fully captured in the aggregate GDP–PSI relationship within the sample period.

Overall, the findings demonstrate that Uganda's economic growth is predominantly driven by private sector investment, while public investment plays a relatively limited direct role. This pattern is consistent with broader evidence from Sub-Saharan Africa, where private domestic investment is more consistently associated with growth than public investment (Abu and Karim 2016; Adams 2009; Ogunjinmi 2022) and Asia (Mohamed et al. 2013; Tang et al. 2008), especially when governance and efficiency constraints are present.

5.3 Moderating Role of Monetary Policy

The findings from the ARDL models with interaction terms show that monetary policy plays a moderate but largely restrictive role in Uganda's domestic investment and economic growth.

Interest Rate:

In the private investment model with interaction terms, the coefficient of the interest rate interaction (PrSI_IR) was approximately -0.0005 ($p = 0.206$) which is negatively statistically insignificant effect. There is evidence that interest rates moderate the investment–growth link in

the short-run. The PrSI_4IR interaction is sometimes significant and negative in levels or differences, suggesting that higher interest rates weaken the short-run association between private investment and GDP. This finding is consistent with (Adams 2009) and (Nunnenkamp and Spatz 2005), who argue that high interest rates constrain investment in developing economies by raising borrowing costs and delaying projects. In Uganda, relatively high lending rates (mean IR = 23.76%), shallow financial markets, and limited access to credit reduce the responsiveness of firms to monetary policy changes, thereby weakening its effectiveness.

Exchange Rate:

Exchange rate interaction (PrSI_ER) was ($\beta = -0.0044, p = 0.523$) in the private investment model. In the public investment model, there is a long-run relationship, and the interaction terms were not robustly identified. In economies with limited export diversification and shallow financial markets, exchange rate movements may have ambiguous effects on growth (Aghion et al. 2009).

Uganda's import-dependent economic structure implies that currency depreciation increases production costs through higher import prices, while appreciation reduces export competitiveness. These offsetting effects may explain the weak overall effect on the movement of exchange rate on Economic Growth. The high volatility of the (log_EXR kurtosis = 7.091) and its negative skewness (-2.147) reflect episodes of sharp depreciation, which may have discouraged investment in import-dependent sectors but boosted competitiveness in tradable.

Overall, the findings demonstrate Interest Rate and Exchange Rate, does not significantly moderate the relationship between domestic investment and economic growth in Uganda in the long run. However, partial evidence that interest rates constrain the investment–growth link in the short run, while exchange rate effects are ambiguous. This pattern is consistent with broader evidence from Sub-Saharan Africa, nominal variables matter for short-run fluctuations but real factors (institutions, technology, human capital) dominate in the long run (Adams 2009; Aghion et al. 2009; Nunnenkamp and Spatz 2005). The findings highlight the importance of maintaining macroeconomic stability without over-relying on monetary policy to drive growth. While reducing extreme volatility in interest rates and exchange rates can lower uncertainty and support investment planning, sustained growth depends more on structural reforms that boost private investment productivity and efficiency.

CHAPTER SIX

SUMMARY, CONCLUSION, AND STUDY RECOMMENDATIONS

6.0 Introduction

This chapter starts by presenting the summary of the findings, conclusion and study recommendation in examining the relationship between domestic investment and economic growth in Uganda from 1985 to 2023.

6.1 Summary of the Study

The descriptive statistics and graphical analysis revealed clear and economically meaningful patterns in the key variables:

Economic Growth: GDP exhibited a sustained long-term upward trend, expanding nearly nine-fold from 1985 to 2023, with distinct phases of acceleration (2005–2014, CAGR $\approx$ 6.9%) and deceleration (2015–2023, CAGR $\approx$ 4.3%). The growth path was relatively stable (skewness $\approx$ -0.093; kurtosis $\approx$ 1.668), without extreme boom-bust cycles.

Private Investment: PrSI showed a strong upward trajectory, increasing from UGX 950 million in 1985 to UGX 29 trillion in 2023, with rapid growth in the early reform period (95.70% CAGR in 1985–1994) and the 2000s investment boom (23.00% CAGR in 2005–2014), followed by a slowdown (6.90% CAGR in 2015–2023). The series was negatively skewed (-1.043) with moderate kurtosis (3.489), indicating concentration at higher levels with some peaks.

Public Investment: PSI also increased substantially (from UGX 610 million to UGX 11 trillion) but with higher volatility than GDP or PrSI. Distinct phases included rapid post-conflict reconstruction (94.20% CAGR in 1985–1994), fiscal consolidation (13.70% in 1995–2004), infrastructure push (19.60% in 2005–2014), and moderation (13.50% in 2015–2023). The series was negatively skewed (-1.165) with high kurtosis (4.308), reflecting "stop-go" spending patterns.

Monetary Policy Variables: The interest rate ranged between 18.2% and 40% (mean = 23.76%), with positive skewness (1.506) and leptokurtic distribution (3.846), indicating occasional spikes in policy rates. The exchange rate displayed substantial volatility (log range: 1.905–8.223),

pronounced negative skewness (−2.147), and very high kurtosis (7.091), reflecting episodes of sharp depreciation and external sector pressures.

Co-movement: Pairwise correlations were very high and statistically significant: log_GDP with log_PrSI (0.939), log_GDP with log_PSI (0.918), and between log_PrSI and log_PSI (0.989), indicating strong co-movement between investment and growth.

The relationship between economic growth, Domestic Investment, and Monetary policy was established using the ARDL Bound test, which is stable over the long run. Cointegration with a calculated F-statistic of 5.781, exceeded the 5% upper-bound critical value of 4.85, while the t-statistic of − 3.899 was more negative than the critical value of − 3.53. all the results support the existence of a long-run equilibrium relationship among the variables.

The long-run estimation shows that private investment had a statistically significant positive effect on economic growth. The coefficient ranged from 0.40 to 0.49, with a ($p < 0.01$). Meaning that a 1% increase in private investment in the long run is associated with an estimated 0.40 – 0.49% increase in GDP. The consistency of this result across the different model specifications supports the view, consistent with endogenous growth theory, that private investment contributes meaningfully to economic expansion.

In contrast, public investment with statistical negative insignificant coefficient of − 0.19, with a p-value above 0.10, which means the analysis does not provide sufficient evidence of a direct long-run effect of public investment on GDP during the study period. The result may be associated with inefficiencies in public expenditure, delays in project implementation, or indirect effects such as the possibility that public investment encourages private investment that are not fully reflected in the aggregate model.

The ECT was negative as well and highly significant, with estimates ranging from − 0.08 to − 0.12 and p-values below 0.01. This indicates that deviations from the long-run equilibrium are gradually corrected, with about 8–12% of the disequilibrium being eliminated each year. In the short run, changes in private investment generally had a positive effect on GDP, although the effect was only marginally significant in some specifications. For example, the coefficient on $\Delta \log_PrSI$ was approximately 0.046, with a p-value of about 0.07. The short-run effect of public investment, however, was less stable across the estimated models.

Private-investment model, the presence of a long-run relationship, with an F-statistic of 5.501, exceeding the upper-bound critical value of 4.35, and a t-statistic of -3.974 was less than the critical value of -3.78 . The long-run coefficient on $\log_PrSI$ is positive and statistically significant at 0.40, with a p-value of 0.001. However, the interaction terms are statistically insignificant. Specifically, the $PrSI_IR$ had a p-value of 0.206, while the $PrSI_EXR$ had a p-value of 0.523. In the short run, some evidence of higher interest rates may weaken the positive relationship between private investment and economic growth, as the $PrSI_IR$ interaction was negative and statistically significant in some specifications.

In the public-investment model, null hypothesis of no long-run relationship is rejected with F-statistic of 2.149 below the lower-bound critical value of 2.72, and the t-statistic of -0.860 did not satisfy the required critical conditions. The long-run coefficients for public investment and its interaction terms cannot be regarded as reliable evidence of long-run effects. The short-run interaction terms were generally insignificant or numerically very small, possibly because of scaling problems.

6.2 Conclusion

Over the period 1985 – 2023, Uganda has achieved substantial economic expansion and capital formation, with GDP and domestic investment increasing across the study period. However, the growth trend has not been constant, with distinct periods of acceleration (notably 2005–2014) and deceleration (2015–2023), reflecting policy regimes, external shocks, and structural constraints. Private investment is more consistent in upward movement, while public investment has been volatile and subject to fiscal and governance. Monetary policy variables have exhibited significant volatility, indicating macroeconomic instability that may have constrained investment efficiency.

The study provides evidence that PrSI is a key determinant of long-run Growth in Uganda, with 0.40% – 0.49%. This finding supports the theory used in this study and aligns with empirical evidence from other developing countries. In contrast, PSI show dose not a significant direct long-run effect on GDP, most likely due to inefficiencies, implementation delays, and governance constraints. The strong co-movement between public and private investment (correlation = 0.989) suggests complementarity, but the direct growth dividend from public spending is limited within the sample period.

While monetary policy affects financing conditions and may influence investment timing and volumes, there is no robust evidence that interest rates or exchange rates fundamentally alter the long-run response to output with respect to private investment. In the short run, higher interest rates may weaken the investment–growth link by raising borrowing costs and delaying projects, but this effect does not persist in the long run. Exchange rate effects are ambiguous, reflecting Uganda's import-dependent structure and limited financial development.

The error correction term indicates that 8 – 12% of any long run deviation disequilibrium is corrected annually, implying a half-life of approximately 6 – 9 years. This gradual adjustment reflects structural rigidities in Uganda's economy, including financial market frictions, infrastructure bottlenecks, institutional constraints, and policy uncertainty. These factors slow down the responsiveness of investment and output to growth opportunities and shocks.

The insignificant long-run effect of public investment suggests that its effectiveness depends more on quality than quantity. Challenges such as procurement inefficiencies, weak monitoring systems, cost overruns, and misallocation of resources may limit the growth-enhancing potential of public

spending. Public investment may exert its influence indirectly by crowding-in private investment through improved infrastructure, enhancing total factor productivity, or providing social infrastructure that improves human capital over longer horizons.

6.3 Study Recommendations

Considering the trends and Pattern in the domestic investment, economic growth monetary policy, the study recommends that policymakers prioritize macroeconomic stability as a foundation for sustainable investment. The volatility observed in interest rates and exchange rates suggests the need for consistent and coordinated fiscal and monetary policies. Maintaining low and stable inflation, reducing exchange rate fluctuations, and ensuring fiscal discipline will create a predictable environment that fosters investor confidence. In addition, efforts should be made to strengthen domestic resource mobilization by promoting savings and expanding financial inclusion, which are essential for sustaining long-term investment growth.

Regarding effect of domestic investment on economic growth, the findings demonstrate that private sector investment a key primary driver of growth in Uganda. Therefore, government policy should focus on strengthening the private sector through improving the ease of doing business, reducing regulatory constraints, and enhancing access to affordable credit. Targeted support to key to sectors with high productivity such as agriculture, manufacturing, and information and communication technology (ICT) is crucial for promoting value addition and employment creation. Ineffectiveness of public investment calls for urgent reforms in public investment management. This includes improving project selection, strengthening monitoring and evaluation systems, and enhancing transparency and accountability to ensure that public resources are efficiently utilized. Furthermore, promoting public–private partnerships (PPPs) would enable the government to leverage private sector efficiency while addressing infrastructure gaps.

Third, in relation to the moderating role, the study highlights the need to enhance the effectiveness of monetary policy to support investment and growth. High interest rates were found to constrain investment, suggesting that monetary authorities should aim to maintain relatively low and stable lending rates to stimulate private sector activity. Additionally, there is a need to widen financial markets to improve access to credit, particularly for small and medium-sized enterprises, to strengthen the transmission of monetary policy. Exchange rate management should also be improved through policies that promote export diversification and reduce dependence on imports,

thereby minimizing import inflation. Importantly, stronger coordination between fiscal and monetary authorities is necessary to ensure that policy measures are mutually reinforcing rather than conflicting.

6.4 Suggestions for Further Research

Further studies should consider extending the analysis by incorporating variables such as foreign direct investment (FDI), trade openness, and human capital of economic growth dynamics.

Further studies to apply Vector Error Correction Models (VECM) model to capture potential asymmetries in the investment–growth relationship.

In addition, comparative studies across countries in the East African region would provide useful insights into regional growth patterns and policy effectiveness.

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APPENDICES

APPENDIX I: STRUCTURED DATA CAPTURE TEMPLATE

Year	Data Source	Variable	Symbol	Value	Measurement Unit	Notes
1985 - 2023	WORLD BANK	GDP Growth	GDPG		Real UGX	
1985 - 2023	WORLD BANK	Public Sector Investment	PSI		Real UGX	
2010	WORLD BANK	Private Sector Investment	PrSI		Real UGX	
1985 - 2023	Bank of Uganda	Exchange Rate	EXR		Shs/US\$ (Period Average)	
1985 - 2023	Bank of Uganda	Interest Rate (Lending Rate)	IR		%	

APPENDIX II: SELECTION-ORDER CRITERIA

Sample: 1989 - 2023

Number of obs = 35

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-44.916	0.003	2.738	2.784	2.871			
1	115.601	321.030	9	0.000	5.4e-07*	-5.92006*	-5.73597*	-5.38679*
2	124.293	17.383*	9	0.043	0.000	-5.902	-5.580	-4.969
3	128.207	7.828	9	0.552	0.000	-5.612	-5.152	-4.279
4	131.537	6.660	9	0.672	0.000	-5.288	-4.690	-3.555

Endogenous: log_GDP log_PSI log_PrSI

Exogenous: _cons

APPENDIX V: BOUND TESTING RESULTS

ARDL(1,0,1) regression

Sample: 1986 - 2023

Number of obs = 38

R-squared = 0.3472

Adj R-squared = 0.2681

Log likelihood = 83.780439

Root MSE = 0.0286

D.log_GDP	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
ADJ						
log_GDP						
L1.	-0.084	0.021	-3.900	0.000	-0.127	-0.040
LR						
log_PSI	-0.188	0.176	-1.070	0.294	-0.545	0.170
log_PrSI						
--.	0.485	0.150	3.230	0.003	0.179	0.792
SR						
log_PrSI						
D1.	0.046	0.025	1.860	0.071	-0.004	0.096
_cons	1.962	0.505	3.890	0.000	0.935	2.990

note: estat btest has been superseded by estat ectest
as the prime procedure to test for a levels relationship.
(click to run)

APPENDIX III: PESARAN/SHIN/SMITH (2001) ARDL BOUNDS TEST

H0: no levels relationship $F = 5.781$

$t = -3.899$

Critical Values (0.1-0.01), F-statistic, Case 3

	[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
k_2	3.170	4.140	3.790	4.850	4.410	5.520	5.150	6.360

accept if $F < \text{critical value for } I(0) \text{ regressors}$

reject if $F > \text{critical value for } I(1) \text{ regressors}$

Critical Values (0.1-0.01), t-statistic, Case 3

	[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
k_2	-2.570	-3.210	-2.860	-3.530	-3.130	-3.800	-3.430	-4.100

accept if $t > \text{critical value for } I(0) \text{ regressors}$

reject if $t < \text{critical value for } I(1) \text{ regressors}$

k: # of non-deterministic regressors in long-run relationship

Critical values from Pesaran/Shin/Smith (2001)

APPENDIX IV: DATASET

YEAR	Growth Domestic Product (GDP)	Public Sector Investment (PSI)	Private Sector Investment (PrSI)	Exchange Rate) (EXR)	Interest Rate (IR)	log_gdp	log_psi	log_prsi	log_EXR
1985	16,000,000,000,000	610,000,000	950,000,000	7	24.00	30.4036	20.229	20.672	1.905118
1986	16,000,000,000,000	1,400,000,000	2,200,000,000	14	33.33	30.4036	21.0597	21.5117	2.639057
1987	16,000,000,000,000	5,400,000,000	6,700,000,000	43	34.67	30.4036	22.4097	22.6254	3.757503
1988	18,000,000,000,000	22,000,000,000	22,000,000,000	106	35.00	30.5214	23.8143	23.8143	4.664721
1989	19,000,000,000,000	49,000,000,000	51,000,000,000	223	40.00	30.5755	24.6151	24.6551	5.407584
1990	20,000,000,000,000	86,000,000,000	89,000,000,000	429	38.67	30.6268	25.1776	25.2119	6.061119
1991	21,000,000,000,000	140,000,000,000	140,000,000,000	734	34.42	30.6755	25.6649	25.6649	6.598523
1992	22,000,000,000,000	200,000,000,000	230,000,000,000	1,134	39.11	30.7221	26.0216	26.1613	7.033357
1993	24,000,000,000,000	260,000,000,000	330,000,000,000	1,195	24.26	30.8091	26.284	26.5224	7.085918
1994	25,000,000,000,000	240,000,000,000	400,000,000,000	979	20.76	30.8499	26.2039	26.7147	6.886986
1995	28,000,000,000,000	240,000,000,000	630,000,000,000	969	20.16	30.9632	26.2039	27.169	6.876179
1996	31,000,000,000,000	270,000,000,000	770,000,000,000	1,046	20.29	31.065	26.3217	27.3697	6.952805
1997	32,000,000,000,000	260,000,000,000	860,000,000,000	1,083	21.37	31.0968	26.284	27.4802	6.9875
1998	34,000,000,000,000	350,000,000,000	850,000,000,000	1,240	20.86	31.1574	26.5812	27.4685	7.123116
1999	37,000,000,000,000	440,000,000,000	1,100,000,000,000	1,455	21.55	31.2419	26.81	27.7263	7.282644
2000	38,000,000,000,000	570,000,000,000	1,200,000,000,000	1,644	22.92	31.2686	27.0689	27.8133	7.405173
2001	40,000,000,000,000	610,000,000,000	1,300,000,000,000	1,756	22.66	31.3199	27.1367	27.8934	7.4706
2002	43,000,000,000,000	600,000,000,000	1,600,000,000,000	1,798	19.10	31.3922	27.1202	28.101	7.49418
2003	46,000,000,000,000	630,000,000,000	1,900,000,000,000	1,964	18.94	31.4597	27.169	28.2729	7.582596
2004	49,000,000,000,000	760,000,000,000	2,300,000,000,000	1,810	20.60	31.5228	27.3566	28.4639	7.501254
2005	52,000,000,000,000	800,000,000,000	2,800,000,000,000	1,781	19.65	31.5823	27.4079	28.6606	7.484672
2006	58,000,000,000,000	840,000,000,000	3,000,000,000,000	1,831	18.70	31.6915	27.4567	28.7296	7.512863
2007	63,000,000,000,000	1,000,000,000,000	3,600,000,000,000	1,723	19.11	31.7742	27.631	28.9119	7.452106
2008	68,000,000,000,000	1,100,000,000,000	4,500,000,000,000	1,720	20.45	31.8505	27.7263	29.1351	7.450336
2009	73,000,000,000,000	1,900,000,000,000	9,900,000,000,000	2,030	20.96	31.9215	28.2729	29.9236	7.616033

YEAR	Growth Domestic Product (GDP)	Public Sector Investment (PSI)	Private Sector Investment (PrSI)	Exchange Rate) (EXR)	Interest Rate (IR)	log_gdp	log_psi	log_prsi	log_EXR
2010	77,000,000,000,000	2,000,000,000,000	12,000,000,000,000	2,178	20.17	31.9748	28.3242	30.1159	7.68596
2011	84,000,000,000,000	2,600,000,000,000	14,000,000,000,000	2,523	21.83	32.0618	28.5865	30.2701	7.833125
2012	88,000,000,000,000	3,000,000,000,000	15,000,000,000,000	2,505	26.15	32.1084	28.7296	30.3391	7.825869
2013	91,000,000,000,000	5,000,000,000,000	19,000,000,000,000	2,587	23.28	32.1419	29.2405	30.5755	7.858212
2014	95,000,000,000,000	4,000,000,000,000	18,000,000,000,000	2,600	21.58	32.1849	29.0173	30.5214	7.863186
2015	100,000,000,000,000	4,000,000,000,000	17,000,000,000,000	3,241	22.60	32.2362	29.0173	30.4642	8.083529
2016	110,000,000,000,000	3,000,000,000,000	22,000,000,000,000	3,420	23.89	32.3315	28.7296	30.7221	8.137425
2017	110,000,000,000,000	5,000,000,000,000	21,000,000,000,000	3,611	21.28	32.3315	29.2405	30.6755	8.191801
2018	120,000,000,000,000	7,000,000,000,000	22,000,000,000,000	3,727	19.85	32.4185	29.5769	30.7221	8.223377
2019	120,000,000,000,000	8,000,000,000,000	25,000,000,000,000	3,704	19.92	32.4185	29.7105	30.8499	8.217182
2020	130,000,000,000,000	8,000,000,000,000	25,000,000,000,000	3,718	19.11	32.4986	29.7105	30.8499	8.221008
2021	130,000,000,000,000	11,000,000,000,000	24,000,000,000,000	3,587	18.53	32.4986	30.0289	30.8091	8.185085
2022	140,000,000,000,000	11,000,000,000,000	27,000,000,000,000	3,690	18.20	32.5727	30.0289	30.9269	8.213333
2023	140,000,000,000,000	11,000,000,000,000	29,000,000,000,000	3,726	18.59	32.5727	30.0289	30.9983	8.223128

APPENDIX V: THE CAGR (COMPOUND ANNUAL GROWTH RATE)

The CAGR formula is:

$$CAGR = \left(\frac{Ending\ Value}{Beginning\ Value} \right)^{\frac{1}{n}} - 1$$

where:

Value at the end of the period

Value at the start

n is the number of years or compounding periods

To express CAGR as a percentage:

$$CAGR = \left[\left(\frac{Ending\ Value}{Beginning\ Value} \right)^{\frac{1}{n}} - 1 \right] \times 100\%$$