MACROECONOMIC DETERMINANTS OF DOMESTIC PRIVATE INVESTMENT: A COMPARATIVE ANALYSIS OF THREE SOUTHERN AFRICAN COUNTRIES

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GLENDA MALULEKE

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SUPERVISOR: PROF. N.M. ODHIAMBO

CO-SUPERVISOR: DR. S. NYASHA

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DECLARATION

Name: GLENDA MALULEKE

Student number: 47294817

Degree: DOCTOR OF PHILOSOPHY IN ECONOMICS

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Notwithstanding the contribution of the aforementioned individuals and institutions, the responsibility for all the views and any shortcoming of this study, including errors and omissions, is entirely mine, and should not be attributed to any of the abovementioned individuals and institutions.

TO GOD BE THE GLORY

DEDICATION

To my children, Mahlatse and Nsovo Ramalobela

ABSTRACT

The study examined the macroeconomic determinants of domestic private investment in South Africa, Botswana and Malawi for the period from 1980 to 2018, as well as the causal relationship between domestic private investment and its determinants. It also examined whether public investment crowds in or out private investment. Using the ARDL model (Model 1), the study found that public investment and domestic credit to the private sector are key determinants of domestic private investment in South Africa and Botswana. Economic growth is a determinant only in South Africa, while real interest rate is a determinant in Botswana and Malawi. Inflation is a determinant in South Africa and Malawi, while trade openness is a determinant of private investment in all the three countries. Using the NARDL model (Model 2a), the results showed that public investment has significant asymmetric effects on private investment in South Africa, Botswana and Malawi. Using the ARDL model, Model 2b and 2c of the study found that infrastructural public investment crowds in private investment in South Africa, in both the short- and long-run and it crowd out private investment in Botswana in the short-run. With non-infrastructural public investment, crowding out occurs in South Africa and Malawi in the long-run, while in the short-run, crowding out occurs in South Africa, and crowding in occurs in Botswana. In Model 3 there is bidirectional causality between i) private investment and public investment in all the three countries, (ii) private investment and trade openness in all the three countries, (iii) private investment and inflation in South Africa and Malawi, (iv) private investment and credit to the private sector in South Africa and Botswana, (v) private investment and interest rate in Malawi, and (vi) private investment and trade openness in South Africa and Malawi. The causality results also showed that that there is unidirectional causality from (i) economic growth to private investment in South Africa and from private investment to economic growth in Malawi, (ii) interest rate to private investment in Botswana and private investment to interest rate in South Africa, (iii) private investment to credit to the private sector in Malawi, and (iv) trade openness to private investment in Botswana. Based on the findings, policy-makers should pursue policies that will create a conducive environment that will promote private sector investment.

KEYWORDS

Private Investment; Economic Growth; Crowding in/out; Public Investment; Asymmetry; ARDL; NARDL; Error Correction Model; South Africa; Botswana; Malawi; Southern Africa

NKOMISO

SWIKUMISISI SWA IKHONOMIKULU SWA VUVEKISI LEBYI NGA RIKI BYA MFUMO BYA LE TIKWENI: NXOPAXOPO WO FANANISA WA MATIKO YA LE DZONGENI WA AFRIKA MANHARHU

Ndzavisiso lowu wu kambele swikumisisi swa ikhonomikulu swa vuvekisi lebyi nga riki bya mfumo bya le tikweni eAfrika-Dzonga, Botswana na Malawi eka nkarhi wa 1980 kufika 2018, xikan'we na vuxaka lebyi nga na xivangelo exikarhi ka vuvekisi lebyi nga riki bya mfumo bya le tikweni na swikumisisi swa byona. Wu tlhele wu kambela loko vuvekisi bya mfumo byi ri na xitandzhaku xo hlengeleta kumbe xo hangalasa eka vuvekisi lebyi nga riki bya mfumo. Hi ku tirhisa modlolo wa ARDL (Modlolo wa 1), ndzavisiso lowu wu kume leswaku vuvekisi bya mfumo na xikweleti xa le tikweni eka sekitara leyi nga riki ya mfumo i swikumisisikulu swa vuvekisi lebyi nga riki bya mfumo bya le tikweni eAfrika-Dzonga na le Botswana. Ku kula ka ikhonomi i xikumisisi xa vuvekisi lebyi nga riki bya mfumo bya le tikweni ntsena eAfrika-Dzonga, naswona mpimo wa ntswalo wa xiviri i xikumisisi eBotswana na le Malawi. Inifulexini i xikumisisi xa vuvekisi lebyi nga riki bya mfumo bya le tikweni eAfrika-Dzonga na le Malawi, naswona mpfuleko wa mabindzu i xikumisisi eka matiko lamanharhu hinkwawo. Hi ku tirhisa modlolo wa NARDL (Modlolo wa 2a), mivuyelo leyi yi kombe leswaku vuvekisi bya mfumo byi na switandzhaku swa nkandzingano swo tivikana eka vuvekisi lebyi nga riki bya mfumo bya le tikweni eAfrika-Dzonga, eBotswana na le Malawi. Hi ku tirhisa modlolo wa ARDL, Modlolo wa 2b na 2c ku kumeke leswaku vuvekisi bya mfumo bya switirhisiwakulu byi hlengeleta vuvekisi lebyi nga riki bya mfumo eAfrika-Dzonga eka havumbirhi bya nkarhi wo koma na wo leha naswona byi hangalasa vuvekisi lebyi nga riki bya mfumo eBotswana eka nkarhi wo koma. Hi mayelana na vuvekisi bya mfumo eka leswi nga riki switirhisiwakulu, ku hangalasa swi humelela eAfrika-Dzonga na le Malawi eka nkarhi wo leha, naswona ku hangalasa swi humelela eAfrika-Dzonga, kasi ku hlengeleta swi humelela eBotswana eka nkarhi wo koma. Eka Modlolo wa 3, ku na xivangelo xa matlhelombirhi exikarhi ka (i) vuvekisi lebyi nga riki bya mfumo na vuvekisi bya mfumo eka matiko lamanharhu hinkwawo (ii) vuvekisi lebyi nga riki bya mfumo na mpfuleko wa mabindzu eka matiko lamanharhu hinkwawo, (iii) vuvekisi lebyi nga riki bya mfumo na inifulexini eAfrika-Dzonga na le Malawi, (iv)

vuvekisi lebyi nga riki bya mfumo na xikweleti eka sekitara leyi nga riki ya mfumo eAfrika-Dzonga na le Botswana, (v) vuvekisi lebyi nga riki bya mfumo na mpimo wa ntswalo eMalawi, na (vi) vuvekisi lebyi nga riki bya mfumo na mpfuleko wa mabindzu eAfrika-Dzonga na le Malawi. Mivuyelo leyi nga na xivangelo yi tlhele yi komba leswaku ku na xivangelo lexi yaka etlhelo rin'we (i) kusuka eka ku kula ka ikhonomi kuya eka vuvekisi lebyi nga riki bya mfumo eAfrika-Dzonga na kusuka eka vuvekisi lebyi nga riki bya mfumo kuya eka ku kula ka ikhonomi eMalawi, (ii) kusuka eka mpimo wa ntswalo kuya eka vuvekisi lebyi nga riki bya mfumo eBotswana na kusuka eka vuvekisi lebyi nga riki bya mfumo kuya eka mpimo wa ntswalo eAfrika-Dzonga, (iii) kusuka eka vuvekisi lebyi nga riki bya mfumo kuya eka xikweleti eka sekitara leyi nga riki ya mfumo eMalawi, na (iv) kusuka eka mpfuleko wa mabindzu kuya eka vuvekisi lebyi nga riki bya mfumo eBotswana. Hi ku ya hi swikumiwa, vaendlatipholisi va fanele ku landza tipholisi leti ti nga ta tumbuluxa mbangu lowu wu nga ta kondletela vuvekisi bya sekitara leyi nga riki ya mfumo.

MARITOKULU

Vuvekisi lebyi nga riki bya mfumo; ku kula ka ikhonomi; ku hlengeleta/ku hangalasa; vuvekisi bya mfumo; nkandzingano; ARDL; NARDL; modlolo wo lulamisa swihoxo; Afrika-Dzonga; Botswana; Malawi; Dzonga wa Afrika

KAKARETŠO

DINTLHA TŠA MAKHEROIKONOMI TŠEO DI HUETŠAGO DIPEELETŠO TŠA PHORAEBETE KA NAGENG: TSHEKATSHEKO YA PAPETŠO YA DINAGA TŠE THARO TŠA KA BORWA BJA AFRIKA

Nyakišišo ye e sekasekile dintlha tša makheroikonomi tšeo di huetšago dipeeletšo tša phoraebete ka Afrika Borwa, Botswana le Malawi mo lebakeng la 1980 go fihla ka 2018, gammogo le kamano magareng ga peeletšo ya phoraebete ya dinaga le mabaka a dipeeletšo. Nyakišišo e sekasekile gape ge e ba dipeeletšo tša mmušo di hlahloša goba di phuhlamiša kelo ya tswala go dipeeletšo tša phoraebete. Ka go šomiša mmotlolo wa ARDL (Mmotlolo wa 1), nyakišišo e hweditše gore peeletšo ya mmušo le sekoloto sa naga go lekala la phoraebete ke dintlha tše di laolago dipeeletšo tša phoraebete ka Afrika Borwa le Botswana. Kgolo ya ikonomi e laola dipeeletšo tša phoraebete ka Afrika Borwa fela, gomme kelotswala ke laola ka Botswana le Malawi. Infleišene e laola dipeeletšo tša phoraebete ka Afrika Borwa le Malawi, gomme kgwebišano ya boditšhabatšhaba e a laola ka dinageng tše tharo ka moka. Ka go šomiša mmotlolo wa NARDL (Mmotlolo wa 2a), dipoelo di laeditše gore peeletšo ya mmušo e na le dipoelo tša go se lekalekane go dipeeletšo tša phoraebete ka Afrika Borwa, Botswana le Malawi. Ka go šomiša mmotlolo wa ARDL, Mmotlolo wa 2b le 2c nyakišišo e hweditše gore dipeeletšo tša mmušo tša mananeokgoparara di hlahloša kelo ya tswala go dipeeletšo tša phoraebete ka Afrika Borwa go nako ye kopana le ye telele gomme di phuhlamiša dipeeletšo tša phoraebete ka Botswana go nako ye kopana. Go dipeeletšo tša mmušo tšeo e sego tša mananeokgoparara, phuhlamo ya kelo ya tswala e ba gona ka Afrika Borwa le Malawi ka nako ye telele, gape phuhlamo ya kelo ya tswala e ba ka Afrika Borwa gomme hlahlošo ya kelo ya tswala e ba ka Botswana ka nako ye kopana. Mo mmotlolong wa 3, go na le kamano magareng ga (i) peeletšo ya phoraebete le peeletšo ya mmušo go dinaga tše tharo ka moka, (ii) peeletšo ya phoraebete le kgwebišano ya boditšhabatšhaba go dinaga tše tharo ka moka, (iii) peeletšo ya phoraebete le infleišene ka Afrika Borwa le Malawi, (iv) peeletšo ya phoraebete le sekoloto go lekala la phoraebete ka Afrika Borwa le Botswana, (v) peeletšo ya phoraebete le kelotswala ka Malawi, le (vi) peeletšo ya phoraebete le kgwebišano ya boditšhabatšhaba ka Afrika Borwa le Malawi. Dipoelo tša kamano di

laeditše gape gore go na le kamano ya tsela e tee (i) go tšwa go kgolo ya ikonomi go ya go peeletšo ya phoraebete ka Afrika Borwa le go tšwa go peeletšo ya phoraebete go ya go kgolo ya ikonomi ka Malawi, (ii) go tšwa go kelotswala go ya go peeletšo ya phoraebete ka Botswana le go tšwa go peeletšo ya phoraebete go ya go kelotswala ka Afrika Borwa, (iii) go tloga go peeletšo ya phoraebete go ya go sekoloto go lekala la phoraebete ka Malawi, le (iv) go tšwa go kgwebišano ye e bulegilego ya dinaga go ya go peeletšo ya phoraebete ka Botswana. Go ya ka diphihlelelo, boramolao ba swanetše go tla ka melawana yeo e tlago hlola sebaka sa go hlohleletša dipeeletšo go makala a phoraebete.

MANTŠU A BOHLOKWA

Peeletšo ya phoraebete; kgolo ya ikonomi; tlhahlošo/phuhlamo ya kelo ya go tswala; peeletšo ya mmušo; go se lekalekane; ARDL; NARDL; mmotlolo wa phošollo ya phošo; Afrika Borwa; Botswana; Malawi; Borwa bja Afrika

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LIST OF ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIS	Automotive Investment Scheme
AsgiSA	Accelerated and Shared Growth Initiative for South Africa
ARDL	Autoregressive Distributed Lag
BDS	Brock-Dechert-Scheinkman
BIS	Black Industrialist Scheme
BBMO	Brand Botswana Management Organisation
CEDA	Citizen Entrepreneurial Development Agency
CIP	Critical Infrastructure Programme
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMQ	Cumulative Sum of Squares of Recursive Residuals
DF-GLS	Dickey-Fuller Generalised Least Square
DPE	Department of Public Enterprises
DTIC	Department of Trade, Industry and Competition
ECM	Error Correction Model
EDD	Economic Diversification Drive
EMIA	Export Marketing and Investment Assistance Scheme
EPZs	Export Processing Zones
FAP	Financial Assistance Policy
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution
GMM	Generalised Method of Moments
GNP	Gross National Product
IDZs	Industrial Development Zones

IMF	International Monetary Fund
LED	Local Economic Development
MEGS	Malawi Economic Growth Strategy
MGDS	Malawi Growth and Development Strategy
MITC	Malawi Investment Trade Centre
MPS	Monetary Policy Statement
NARDL	Nonlinear Autoregressive Distributed Lag
NDP	National Development Plan
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PEEPA	Public Enterprise Evaluation and Privatisation Agency
PP	Phillips-Perron
PPP	Public Private Partnership
RDP	Reconstruction and Development Programme
SEZ	Special Economic Zones
SMME	Small, Medium and Micro Enterprise
SOE	State-owned Enterprise
SSA	sub-Saharan Africa
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WDI	World Development Indicators

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 BACKGROUND TO THE STUDY

While many studies have aimed to identify the determinants of private investment, little consensus has been reached. The debate regarding which macroeconomic variables are the determinants of private investment is still ongoing. Over the years, the literature has shown that many different macroeconomic variables have been identified as the drivers of private investment. Studies, such as those of Greene and Villanueva (1991), Rodrik (1991), Serven (1998), Ndikumana (2000), and Hassan and Salim (2011) investigated the determining factors of private investment but the results were inconsistent. For example, various studies have found the determinants of private investment to be factors such as public sector investment (Oshikoya, 1994; Ghura & Goodwin, 2000), external debt (Greene & Villanueva, 1991; Ajide & Lawanson, 2012), interest rates (Oshikoya, 1994), inflation (Greene & Villanueva, 1991), economic growth (Sakr, 1993; Oshikoya, 1994; Molapo & Damane, 2015), and terms of trade (Acosta & Loza, 2005). Despite the significance of identifying the factors that determine the level of private investment, the findings in literature are mixed and inconclusive, as shown above.

As with the determinants of private investment, there have been ongoing debates regarding the crowding effects of public investment on private investment. The various studies that examined whether public investment leads to the crowding in or out of private investment have shown inconsistent findings. Some studies, such as those of Odedokun (1997), Pereira (2001) and Ramirez and Nazmi (2003), found that public investment crowds in private investment, while Karagöl (2004), Acosta and Loza (2005), Mitra (2006), Bint-e-Ajaz and Ellahi (2012), and Dash (2016) found the opposite, and determined that it crowds out private investment.

In addition, the majority of the studies on the impact of public investment on private investment focused on the impact of aggregate public investment, and not on the impact of disaggregated public investment into infrastructure and non-infrastructure public investment. Specific studies, such as those of Sakr (1993), Odedokun (1997),

and Makuyana and Odhiambo (2019), among others, that focused on the impact of infrastructure and non-infrastructure public investment are scant and inconclusive.

In recent times the debate has widened, extending from merely establishing the determinants of private investment, to the addition of the causality element, further determining the direction of causality between private investment and its determinants (Tan & Tang, 2012; Muyambiri, Chiwira, Chiranga & Michael, 2012). Furthermore, in terms of the causality between private investment and its determinants, the literature is both scant and inconclusive, leaving policy gaps, especially in African countries, where economies are desperate to increase investment and improve their economic growth prospects.

Prior studies tended to focus on determining the factors of private investment. However, little attention has been given to the assessment of the causal linkages between private investment and its determinants (Erenburg & Wohar, 1995; Molapo & Damane, 2015). As such, the literature displays four views in terms of the causal relationship between private investment and its determinants. These are: unidirectional causality from determinants to private investment; unidirectional causality from private investment to its determinants; bidirectional causality between private investment and its determinants; and no causality between private investment and its determinants (Erenburg & Wohar, 1995).

The results derived from the few studies that have been identified are, however, far from being conclusive. The causality results suggest the relationships vary from one country to another, and from one variable to the other, creating a need for another empirical study in the countries to determine the direction and the causal linkage. The inconclusive results related to the determinants of private investment, the crowding effect of public investment on private investment, and the direction of causality between private investment and its determinants, prompted the need for the current study, since the countries included in the study aim to increase their level of investment.

The current study re-examine the determinants of domestic private investment using the Autoregressive Distributed Lag (ARDL) methodology, and assesses the crowding effect of public investment on private investment using both the ARDL and Nonlinear Autoregressive Distributed Lag (NARDL) approaches. The current study further

assesses the crowding effect of disaggregated public investment on private investment; and investigates the causal linkage between private investment and its determinants using multivariate Granger-causality testing within the ARDL framework in the three study countries, namely, South Africa, Botswana and Malawi. The study further probes whether the outcomes of the study differ depending on the country of study.

Most of the previous studies examining the determinants of private investment in Africa are cross-country in nature (Mlambo and Oshikoya, 2001; Fowowe, 2011; and Ngoma *et al.,* 2019). Therefore, this study investigates and provides new country-based evidence on the determinants of domestic private investment in South Africa, Botswana and Malawi.

The countries has developed policies over the years with the aim of encouraging the participation of the private sector in the economy and achieve higher economic growth. Achieving a sustainable economic growth is one of the objectives of the government in the three Southern African countries. Even though the countries are at different levels of development, they have high levels of poverty. The World Bank ranks both South Africa and Botswana as upper-middle income countries while Malawi is ranked low-income country. Botswana has pursued poverty reduction since independence in 1966 (Lekobane, 2022). In South Africa, the government aim to eradicate poverty by 2030 through the National Development Plan (NDP). Malawi has experienced high levels of poverty and have developed policies such as the Malawi Poverty Reduction Strategy (MPRS) with the aim to reduce poverty (Government of Malawi, 2002). Economic growth has been found that it can reduce poverty in developing countries (see Adams, 2004). Therefore, the countries need to achieve higher economic growth in order to reduce poverty and private investment has been found to play an important role in the economic growth process. Botswana has experience a rapid economic growth when compared to South Africa and Malawi. For the period from 1980 to 2018, economic growth was an average of 6.4% in Botswana, 3.4% in Malawi and 2.3% in South Africa (World Bank, 2021). Studies such as Khan and Reinhart (1990) and Ponce and Navarro (2016) have found that private investment has more impact than public investment on economic growth. In South Africa, Makuyana and Odhiambo (2018) found that private investment has a positive impact on economic growth. As a

result, the determinants of domestic private investment has become one of the focus in policy debates in developing countries such as South Africa, Botswana and Malawi.

In addition, there were a number of reasons for the choice of these three countries. Firstly, South Africa and Botswana have been grouped as upper middle-income countries, while Malawi has been classified as a low-income country (World Bank, 2021). Although two countries fall within the same income country grouping, the determinants of domestic private investment are expected to be different for all the selected countries. This is due to the differences in the size of the two countries, and differences in social and political factors. Secondly, the availability of data for the period of study prompted the selection of the countries. Thirdly, the studies on the determinants of private investment, the causality between private investment and its determinants, along with the crowding effects of public investment on private investment, have not been adequately covered in the selected three countries. As private investment has been found to lead to higher economic growth and the selected countries are engaging with the private sector to boost their economies, it thus becomes for crucial for policy makers to understand the factors that drive private investment. Therefore, this study attempts to examine the determinants of domestic private investment in South Africa, Botswana and Malawi, which has so far received relatively scant attention in the literature.

1.2 STATEMENT OF THE PROBLEM AND SIGNIFICANCE OF THE STUDY

Developing countries, including the countries selected for the study, face challenges related to achieving sustainable economic growth and are looking at ways to improve their economic growth. Developing countries also face the challenge of reducing poverty and unemployment. Countries with a high participation of private investment achieve higher economic growth (Majeed & Khan, 2008). Hence, the selected countries have over the years been developing policies to include the private sector to enable them to achieve their objectives. The policies and strategies of each country aim to create a conducive environment for the development of the private sector in the country.

In the case of South Africa, the country has over the years developed policies that promote investment, inclusive of domestic private investment. This includes the

restructuring of State-Owned Entreprises (SOEs) with the aim of mobilising capital from the private sector (Department of Public Enterprises (DPE), 2000). The promotion of private investment has continued to be the focus of the policies that have been formulated after 1994. Through the National Development Plan (NDP), the government plans to increase gross fixed capital formation to 30% by 2030 (Presidency of South Africa, 2012). Similarly, in the case of Botswana, the government has been working on the development of the private sector. The government economic development strategy is the advancement of economic growth through the involvement of the private sector (Republic of Botswana, 2019). In the case of Malawi, the country has over the years developed a number of policies with the aim of encouraging private investment. These includes the Malawi economic growth strategy and the Malawi growth and development strategy which has prioritised the growth of the private sector.

Even though, the selected countries have developed policies focusing on encouraging investment by the private sector, it has not led to higher levels of private investment. In all the three countries, the level of investment has been fluctuating over the years. In Botswana, private investment as a percentage of GDP declined from 34.5% in 1980 to 23.1% in 2018, while in South Africa, it declined to 15.2% in 2018, from 19.9% in 1980. However, in Malawi, there was an increase from 4.7% in 1980 to 6.4% in 2018 (World Bank, 2021). In addition, the investment by the government has been lower than that of the private sector in South Africa and Botswana while in Malawi, for some years, public investment as a percentage of GDP was higher than private investment as a percentage of GDP for the period from 1980 to 2018. The level of private investment are concerning as the countries have formulated and implemented polices in efforts to increase private investment and stimulate economic growth.

Since private investment has been identified as one of the factors contributing to the growth of the economy, the study attempts to examine the determinants of domestic private investment in South Africa, Botswana and Malawi. The findings will enable the government to know which macroeconomic determinants they should focus on in order to stimulate the level of private investment. Although studies on the determinants of private investment have produced a significant amount of discussion for several years, there has been no consensus on the variables that are regarded as the main determinants. Furthermore, although some studies have found some common

determinants of private investment, whether these determinants are positive or negative have differed from one study to the other.

The inconsistencies in the results related to such a crucial topical study provided the current study with the opportunity to re-examine the following: (i) the determinants of domestic private investment using ARDL; (ii) whether private investment is crowded in or out by public investment using ARDL and NARDL; and (iii) the causal relationship between private investment and its determinants within the multivariate Granger-causality model using ARDL.

Only a limited number of empirical studies have been conducted with regard to the determinants of domestic private investment in the countries that were chosen for the current study, as the debate has not yet received significant attention. The study adds to the inconclusive literature on the determinants of domestic private through an empirical investigation in three Southern African countries. In addition to examining the macroeconomic determinants of domestic private investment, the study also examine causality between private investment and the determinants and the crowding effects of public investment on private investment. This study aims to provide knowledge in understanding the macroeconomic determinants of domestic private investment in South Africa, Botswana and Malawi.

The current study differs in several ways from previous studies on the subject. Firstly, the study did not only examine the macroeconomic determinants of domestic private investment, but it also examined the crowding effects of public investment on private investment, as well as the causal relationship between the determinants and private investment in each country separately. Most of the previous studies only focused on the determinants of private investment.

Secondly, the causality is tested within the multivariate Granger-causality model. Most of the previous studies used the bivariate framework to examine the casual relationship between private investment and its determinants. Thirdly, the study employs the ARDL model for the examination of the determinants of private investment, the crowding effects of public investment on private investment and the causality model. To the best of the researcher's knowledge, the study is among the first to examine the determinants of private investment, and to test the causal

relationship between private investment and its determinants using multivariate Granger-causality in a single study.

Fourthly, as the relationship between the economic variables might not always be linear, there could be an asymmetric or nonlinear relationship among the variables. To cater for this possibility, the study uses the NARDL model to study whether private investment is crowded in or out by gross public investment. Most of the previous studies used the ARDL to examine the crowding effects. The current study is among the first to examine if public investment has a nonlinear crowding in or out effect on private investment using the NARDL approach in the three Southern African countries selected for the study.

Finally, the study analysed two categories of country, namely, low-income (Malawi) and upper middle-income (South Africa and Botswana) countries. The current study aims to determine whether there are similar or differing determinants for countries not in the same growth stage. This study that is conducted on the macroeconomic determinants of domestic private investment will contribute to the ongoing policy debate, and provide assistance to policy-makers in the design of strategies and policies that promote domestic private investment.

The findings of this study will assist policymakers in the development of policies and strategies in the promotion of the private sector investment as well as investment related policies. Furthermore, the study makes a contribution to the existing empirical literature on the macroeconomic determinants of domestic private investment in the countries that have been selected for the study, in particular, and to the overall body of literature on private investment, in general. The inconsistencies in the conclusions related to the determinants of private investment were a strong driver for the topic to be revisited. As a result, the purpose of the study is to evaluate the determinants of domestic private investment.

1.3 RESEARCH QUESTIONS

The study aims to answer the following research questions:

(i) What are the short- and long-run determinants of private investment in the selected countries?

(ii) Does gross public investment have a nonlinear impact on private investment in the short- and long-run?

(iii) Do gross public investment, infrastructure public investment and non-infrastructure public investment crowds in or out private investment in the short- and long-run?

(iv) What is the direction of causality between private investment and its determinants in the short- and long-run?

1.4 OBJECTIVES AND HYPOTHESES OF THE STUDY

This section presents the objectives and the hypotheses that were formulated for the current study.

1.4.1 Objectives of the study

The key objective of the study is to examine the macroeconomic determinants of domestic private investment in selected Southern African countries, namely, South Africa, Botswana and Malawi. The specific objectives of the study are to:

(i) Empirically investigate the main short- and long-run macroeconomic determinants of domestic private investment in the three Southern African countries.

(ii) Empirically examine the linear and nonlinear crowding effects of gross public investment in the short- and long-run.

(iii) Empirically examine the crowding effects of infrastructure public investment and non-infrastructure public investment on private investment for each country in the short- and long-run.

(iv) Empirically examine the direction of causality between domestic private investment and its determinants in the three countries in the short- and long-run.

1.4.2 Hypotheses of the study

The study tests the following hypotheses:

(i) The short- and long-run macroeconomic determinants of domestic private investment are public investment, economic growth, domestic credit to the

private sector, the real interest rate, inflation and trade openness in the selected three countries.

(ii) There is nonlinear impact of gross public investment on private investment in the short- and long-run in the selected three countries.

(iii) The infrastructure public investment crowds in private investment and non-infrastructure public investment crowds out private investments in the short- and long-run in the selected three countries.

(iv) There is causality between private investment and its determinants in the short- and long-run in the selected three countries.

1.5 ORGANISATION OF THE STUDY

The rest of the study is arranged in this way: Chapters 2, 3 and 4 provide a comparative country-based literature review of South Africa, Botswana and Malawi in terms of their private investment policies. These chapters also describe the private sector investment dynamics in the selected three countries. This includes, but is not limited to, the general historical background of investment policy and the trends in private investment over time.

Chapter 5 reviews the literature on private investment and its determinants. The main findings from the review of literature are studied to identify the gaps related to the determinants of private investment.

Chapter 6 discusses the methodology that is used to accomplish the objectives of the study. The ARDL is employed to investigate the determinants of private investment and the crowding effects of disaggregated public investment into infrastructure and non-infrastructure on private investment; the NARDL model is utilised to investigate the nonlinear impact of public investment on private investment, and the multivariate Granger-causality approach is used to determine if private investment causes the determinants or if the determinants cause private investment. Chapter 6 specifies the model that is used, the expected association among the explanatory variables with private investment, the justification of the explanatory variables selected for the study, and the sources of the data.

Chapter 7 presents the empirical findings of the study. The estimation and the interpretation of the results are done according to the methodology discussed.

Chapter 8 summarises the study, provides conclusions to the study and makes policy recommendations. The recommendations for further research and limitations of the study are stated in the last chapter.

CHAPTER 2

OVERVIEW OF DOMESTIC PRIVATE SECTOR INVESTMENT IN SOUTH AFRICA[1]

2.1 INTRODUCTION

This chapter presents a discussion of the policies that the South African government has implemented since the 1980s, as well the incentives that have been implemented to promote investment, and the trends in private investment. The chapter is divided into six sections. Section 2.2 presents the policies that have enhanced private sector participation in the economy. Section 2.3 discusses the incentives to promote private investment in South Africa. Section 2.4 presents a discussion of the trends in private investment in South Africa. Section 2.5 reviews the macroeconomic contributing factors related to private investment in South Africa. Lastly, Section 2.6 presents concluding remarks.

2.2 INVESTMENT POLICY REFORMS IN SOUTH AFRICA

Post-1994, the South African government has focused on improving service delivery, poverty alleviation, job creation, and growing the economy, as can be seen from the policies that the government has implemented over the years. The government has contributed to the continuous growth in investment spending, and has focused on infrastructure development (National Treasury, 1998b).

The government is committed to pursuing policies that promote investment, create jobs and lead to sustainable economic growth. According to the National Treasury (1995), the government identified several macroeconomic requirements, which included increasing investment, improving savings performance, and the inflow of foreign investment. In addition to the above requirements, the government has, over the years, adopted several policies and measures to create jobs and promote private

[1] This chapter produced an article entitled 'The dynamics of private investment in South Africa: A review of policies and trends', which was published in *USV Annals of Economics and Public Administration*, Vol.22, Issue 2(36), 2022.

investment. The policies that have been developed to improve investment levels in South Africa are discussed in Sections 2.2.1 – 2.2.6.

2.2.1 Privatisation of State-owned Enterprises

The privatisation of SOEs in South Africa started in 1985. After foreign loans were cut off in 1985, the government realised that there would be capital shortages in the governmental corporations, as they were the major recipients of the loans (Jerome, 2004). The sales of the corporations' assets could reduce the debt burden, and the government would also receive new revenue that was needed for its social programmes (Jerome, 2004).

According to Gumede, Asmah-Andoh and Kabir (2016), the White Paper on Privatisation and Restructuring, which was formulated in 1987, stated that the privatisation process formed part of a strategy where the government's involvement in the economy could be limited to create opportunities for the private sector, and in such a way, that they would be able to develop with minimal government involvement and regulation.

Mostert (2002) listed the reasons for privatisation, as stated in the White Paper, as firstly, to develop a supporting environment with opportunities for the private sector; secondly, to reduce the size and spending of the government to allow business to develop and grow without government interference and fewer rules, among others.

The pre-1994 government aimed to boost the involvement of the private sector in the economy through a process of privatisation. It also believed that privatisation would improve the performance of the economy through the effective use of the factors of production, optimal functioning of market forces, and increasing the net fixed investment of the private sector (Gumede *et al*., 2016).

After the election of the new democratic government in 1994 there were more than 300 government-owned enterprises that had control of more than 50% of the fixed capital assets in the economy (Jerome, 2004). Therefore, the government continued with the privatisation process after 1994, and the restructuring of SOEs was established in 1999 (DPE, 2000). According to the Department of Public Enterprises (DPE) (2000), since 1994, the purpose for restructuring SOEs has been to address the social, economic and political objectives of the government. Some of the aims of

the restructuring programmes included to facilitate economic growth; mobilise private sector capital; create wider ownership in the economy; enhance the competitiveness of state enterprises; and reduce government debt (DPE, 2000).

The above objectives, and the promotion of private sector growth continued to be the focus of the economic policy strategies that were formulated after 1994, namely, the Growth, Employment and Redistribution (GEAR), the Reconstruction and Development Programme (RDP), and the National Framework Agreement (NFA). Table 2.1 presents the key objectives of various policy documents after 1994.

Table 2.1: Key objectives from several policies

RDP(1994)	GEAR (1996)	NFA (1996)	IMCC [2](1999)
Meet the basic needs.	Introduce a budget reform that would support the redistribution of expenditure.	Increase economic growth and employment rate.	Mobilise the capital and expertise of the private sector.
Develop human resources.	Reduce the fiscal deficit.	Meet the basic needs.	Ensure there is inclusive participation in the economy.
Build the economy.	Encourage a competitive and steady currency.	Diverting assets for growth.	Create constructive structures in the sectors where SOEs are dominating.
Democratising state and society.	Introduce tax incentives for new competitive investment and labour absorption.	Enhance the competitiveness and productivity of state enterprises.	Attracting foreign direct investment (FDI).
	Accelerate the restructuring of state assets to improve investment resources.	Facilitate the development of infrastructure through mobilising and redirecting the private sector capital.	Reduce the public sector borrowing requirement.

Source: Department of Public Enterprises (2000:20)

[2] The Inter-Ministerial Cabinet Committee on Restructuring of state assets

2.2.2 Public Private Partnerships

The ‘public private partnership’ (PPP) involves a contract between an institution in the public sector and a private company according to which the private company provides services that are usually performed by the government (National Treasury, 2018b). The PPP policy was first introduced in 1998 in South Africa (National Treasury, 2018b). However, the government’s spending on infrastructure has been low, and for the economy to grow and achieve its vision 2030, the government needs to increase its level of investment.

The NDP has prioritised the investment in energy, water, transport, telecommunication and social infrastructure to grow the economy, and to reduce unemployment and inequality (National Treasury, 2018b). The NDP’s aim is for the infrastructure investment to reach 30% of gross domestic product (GDP) by 2030 (National Treasury, 2018b). The government has made progress towards the 30% target, with infrastructure investment reaching 19.5% of GDP in 2016 (National Treasury, 2018b). However, the government cannot fund the projects on its own, and it needs investment from the private sector. Investments by the private sector assist the government to achieve its target, while at the same time, contributing to improved decision-making (National Treasury, 2018b).

In 2018, out of the R834.1 billion that was planned for the infrastructure spending by the government over the next three years, R18.5 billion would be for the identified PPP projects which accounts for 2.2% of the estimated total budget for government infrastructure (National Treasury, 2018b).

2.2.3 Reconstruction and Development Programme

The Reconstruction and Development Programme (RDP) was launched in 1994 as a way of dealing with the issues of poverty and the socio-economic inequalities facing the country. Its aim was to improve the services provided to the poor. One of the areas that the RDP focused on in its first year was the establishment of an infrastructure investment programme, and it outlined policies in the key programme areas of rural development, urban development and human resource development (National Treasury, 1995).

The government had committed to making substantial public investments to meet the basic needs of all the citizens and to encourage private investment (South African Government, 1994). The government also acknowledged that a successful growth strategy depended on an increase in productive investment from both the public and private sectors. In addition, the government maintained that public investment in sectors of the economy, such as construction, communication, health and human resource development that was aimed at alleviating poverty, would encourage the private sector to invest in the economy (South African Government, 1994). According to the White Paper on Reconstruction and Development, published in the Government Gazette (South African Government, 1994), the government also made a commitment to create an environment that was conducive for investments from the private sector.

2.2.4 Growth, Employment and Redistribution

The Growth, Employment and Redistribution (GEAR) was launched in 1996 after the RDP came to an end, and it was a strategy that aimed to rebuild and restructure the economy. The approach of this policy was for the economy to reach a growth rate of 6% and to create 400 000 jobs per year, for the period from 1996 to 2000 (National Treasury, 1996). In order to achieve its objectives, the government needed to work on the developments that would increase private sector investment; increase investment by the government; and increase the development of infrastructure and delivery of service, among others (National Treasury, 1996).

As stated by National Treasury (1996), the above developments were to be achieved through an environment that would consistently increase private investment, and through the restructuring of the public sector to increase the efficiency of government's capital spending.

The success of the GEAR strategy depended on its ability to increase investment levels in the economy, and ensuring that investment was spent on more labour-absorbing activities (National Treasury, 1998b). However, studies conducted on the South African economy showed that total savings from both domestic and foreign origins need to be increased to 25% of GDP to accomplish an economic growth of 5% (National Treasury, 1998b).

The growth of private investment was to be the driving force to enable the GEAR to achieve its targeted GDP growth rate. This was to be achieved through a decrease in

the fiscal deficit, which it was anticipated would lower the real interest rates, and ultimately lead to an increase in the levels of private investment (Weeks, 1999). The private sector would assist the government to achieve its GEAR objectives, as the government continued to provide incentives to promote investment and supported the privatisation programme. Table 2.2 presents the GEAR targets and investment growth achieved from 1996 to 2000.

Table 2.2: GEAR investment targets and achievement

Year		Real government investment growth (%)	Real parastatal investment growth (%)	Real private investment growth (%)
1996	Target	3.4	3.0	9.3
	Achieved	3.0	1.9	12.3
1997	Target	2.7	5.0	9.1
	Achieved	3.1	2.0	12.5
1998	Target	5.4	10.0	9.3
	Achieved	3.0	3.0	12.1
1999	Target	7.5	10.0	13.9
	Achieved	2.7	2.1	11.3
2000	Target	16.7	10.0	17.0
	Achieved	2.7	1.6	11.4
Average	Target	7.1	7.6	11.7
	Achieved	2.9	2.1	11.9

Source: Department of Finance (1996); South Africa Reserve Bank (2019)

At the implementation of this strategy, it was anticipated that private investment would grow at an average of 11.7%, while public investment would grow at 7.1%. The reality was that the government investment averaged 2.9%, against the target of 7.1%, while parastatal investments averaged 2.1%, against the target of 7.6%. The GEAR was able to achieve the target of private investment, as it achieved an average of 11.9%, against the target of 11.7%. This was due to the incentives that had been introduced to encourage private sector investment. The real interest rate also decreased from 10.8% in 1996 to 5.2% in 2000, while the GDP growth rate was 4.3% in 1996, and 4.2% in 2000 (World Bank, 2021).

This policy did not achieve its desired economic growth rates. The government subsequently adopted the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) that replaced the GEAR in 2006.

2.2.5 Accelerated and Shared Growth Initiative for South Africa

The government introduced the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) in 2006, with the objective of reducing unemployment and poverty in half by 2014 (Presidency of South Africa, 2007). To achieve its objectives, the government planned to increase its investment by focusing on infrastructure development that included the upgrading and building of energy infrastructure, ports, railways and roads.

To achieve its objective, the economy needed to grow at an annual average of 6% (Presidency of South Africa, 2007). One of the actions needed, as identified by AsgiSA, that would assist in achieving the needed economic growth was to eliminate the problems preventing the government from achieving the desired investment by the private and public sector. For the period from 2006 to 2008, there was an improvement in the level of private and public investment. Private investment grew from 16.1% in 2006 to 19.9% in 2008, while public investment increased from 2.8% in 2006 to 3.7% in 2008 (World Bank, 2021).

In 2007, despite the rising interest rates, the level of investment reached 20.6% of GDP. This was the highest level of investment since 1985, and it was close to the investment target of 25% of GDP by 2014 that was set for AsgiSA (Presidency of South Africa, 2007). In the same year, private investment grew at 14.8%, while public sector investment also continued to increase, as projected in AsgiSA (Presidency of South Africa, 2007).

2.2.6 National Development Plan

In 2012, the National Development Plan (NDP) was developed, with the objective of reducing inequality and eradicating poverty by 2030. Through the NDP, the government aimed to lower the cost of living and conducting business, which it anticipated would boost consumer and business confidence, the level of investment by the private sector, the growth of the economy, and level of employment (National Treasury, 2013). According to the Presidency of South Africa (2012), to meet its

objective, the government intended to support small businesses by providing finances, reducing the cost of credit and making it easier for small and medium-sized businesses to access finance, and increasing the levels of investment.

Since investment is needed for development, the government needs to spend more on capital expenditure. Through the NDP, the government undertakes to ensure that freight costs are reduced, increase access to finance and support services provided to small businesses and encourage investment by the private sector in renewable energy development (National Treasury, 2013).

According to the Presidency of South Africa (2012), investment spending in South Africa decreased to around 16% of GDP by the early 2000s, compared to just about 30% of GDP in the early 1980s. At the hand of the NDP, the government intends to increase national savings to 25% of GDP (from 16% of GDP); increase the gross fixed capital formation to 30% (from 17%); and increase government sector investment to 10% by 2030 (Presidency of South Africa, 2012).

After the 2009 global financial crisis, the government chose to spend more on consumption expenditure than on investment, while the private sector was reluctant to invest (Presidency of South Africa, 2012). However, seeing that the private sector was reluctant to invest, government changed its spending from consumption to investment, and it was envisaged that public sector investment would help crowds in private investment (Presidency of South Africa, 2012). A platform was provided through the NDP for increased collaboration between government and other stakeholders to enhance consumer and business confidence, and ultimately, to boost the level of investment, employment and growth (National Treasury, 2013).

2.3 INCENTIVES FOR PRIVATE INVESTMENT IN SOUTH AFRICA

The government has introduced a range of incentives aimed at domestic and foreign investors in terms of capital investment and tax exemptions to encourage the type of investment that boosts economic growth, and create employment. This section discusses some of the incentives.

Critical Infrastructure Programme (CIP)

The CIP aims to increase investment by supporting critical infrastructure, while simultaneously, decreasing the costs of investment (Marumo, 2020). The Department

of Trade, Industry and Competition (dtic) (2021) stated that any infrastructure is considered critical if the investment could not work or operate without the aforementioned infrastructure. The CIP mainly intended to attract private investment, however, it also encouraged investment from the public sector that create an enabling environment that leads to an increase in the level of private investments (dtic, 2021).

Export Marketing and Investment Assistance Scheme (EMIA)

The scheme compensated companies for the costs incurred in developing export markets for the products and services of the country, and attracting foreign direct investment (FDI) to South Africa (Le Roux, 2020). The objectives of the scheme are to provide export event marketing assistance to develop new and to grow existing export markets; to provide assistance with the identification of new export markets through international exhibitions and market research; to provide assistance to increase foreign direct investment (FDI) through missions and research on FDI; and to increase the involvement of small, medium and micro enterprises (SMMEs) and black-owned businesses in the country's economy (dtic, 2021).

Automotive Investment Scheme (AIS)

The AIS is an incentive intended to grow and advance the automotive sector by a way of investing in new and/ or replacement models and components (dtic, 2021). This will escalate the capacity of the plant production, assist in creating sustainable jobs, and support the automotive value chain (dtic, 2021). Through the scheme, the country has managed to secure commitments from investments in excess of R45 billion by auto assemblers and component suppliers and this has helped to keep 38 267 jobs (dtic, 2018).

Black Industrialists Scheme (BIS)

Instead of simply shifting the ownership of large companies that are already operating, to empower individuals without there having been a change in the control and decision-making of these companies, in 2015, the government launched the BIS scheme to support committed black industrialists (dtic, 2018). The programme provided support through access to finance and markets, development of skills, and improved standards and productivity (dtic, 2018). The scheme has attracted private investment in the country, as 79 projects amounting to R1.9 billion have been approved, leveraging R7.2 billion in investment by the private sector (dtic, 2018).

Capital Projects Feasibility Programme (CPFP)

The CPFP is an incentive offered by the government in the form of a cost-sharing grant that contributes to the cost of a feasibility study, which is expected to result in projects that lead to a growth in local exports, and that promote the market of capital goods and services in the country (dtic, 2021). Some of the secondary objectives of the CPFP are to 1) attract high levels of investments by local and foreign investors, 2) strengthen the international competitiveness of the capital goods sector and allied industries in the country, 3) create employment that is sustainable in the country, and 4) create a continuous demand for the country's capital goods and services (dtic, 2021).

The above incentives by the government are a way to promote investment, especially, from the private sector. The incentives aim to stimulate investment in the various sectors of the economy. Most of these incentives are provided in a form of grants to those who are interested in investment. According to the dtic (2018), for the period 2011/12 to January 2018, the department has offered support to 14 226 enterprises through incentives that totalled an amount of R61 billion. Most of the support was offered for investments in machinery, plant and equipment, marketing activities of exports, and services of business development.

2.4 PRIVATE INVESTMENT TRENDS IN SOUTH AFRICA

In the 1980s, the imposition of foreign sanctions on South Africa led to a decrease in the levels of investment. The sanctions led to restrictions on new foreign capital investments in South Africa (Chirwa & Odhiambo, 2016). According to Hefti and Staenhelin-Witt (2002), the country suffered a net capital outflow of R16.2 billion, which is equal to an annual average of 2% of the Gross National Product (GNP).

Figure 2.1 provides a graphical illustration of the public, private and total investment in South Africa as a percentage of GDP from 1980 to 2018.

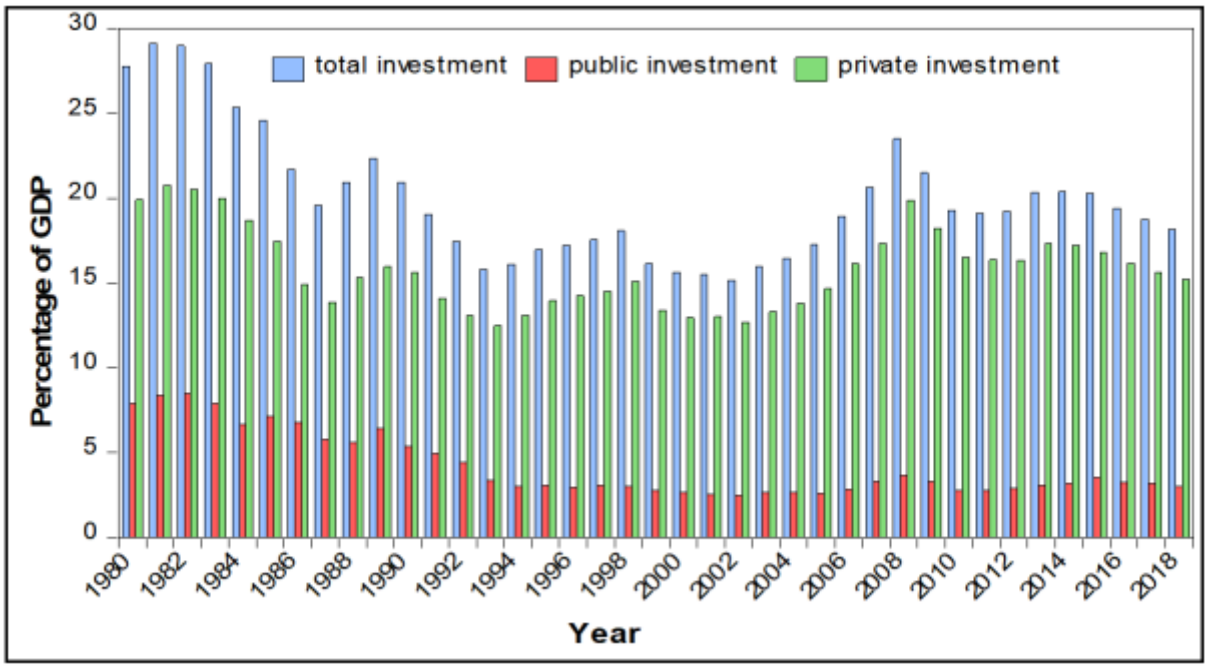


Figure 2.1: Public, private and total investment as a percentage of GDP in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

From 1980 to 2018, private sector investment as a percentage of GDP was always higher than that of government, as displayed in Figure 2.1. Private investment declined from 16% in 1989 to 13.1% in 1992, while public investment shrunk from 6.4% to 4.4% during the same period. According to National Treasury (1993), the decrease in investment from the public and private sectors between 1989 and 1992 could be due to the poor projections for domestic and international economic growth; low levels of capacity utilisation in the manufacturing sector; and the underutilised production capacity of public corporations.

In 2000, private and government investments grew strongly, with gross domestic fixed investment as a percentage of GDP increasing to 15.3%, while investment rose by 5.6% in the first half of 2001 (National Treasury, 2001). Total investment as a percentage of GDP continued to increase, reaching 18.9% in 2006, which is the highest percentage since 1993, when it was 15.8% (Figure 2.1).

In 2008, total investment as a percentage of GDP reached 23.5%, which was the highest level since 1986. The growth of gross fixed capital formation was an average of 1.5% per year from 2010, which is low when compared to the 5.7% annual growth that was averaged in the 2000s (National Treasury, 2018a). The lack of growth in the

levels of investment was mainly due to the low levels of demand and the continued uncertainty regarding policies. However, the government has been working hard to improve the conditions of investment by strengthening governance in government institutions (National Treasury, 2018a). The target of the NDP is the total investment of 30% of GDP by 2030, of which a 10% contribution is expected from the public sector (National Treasury, 2016).

Figure 2.2 provides a graphical illustration of private investment in South Africa as a percentage of GDP from 1980 to 2018.

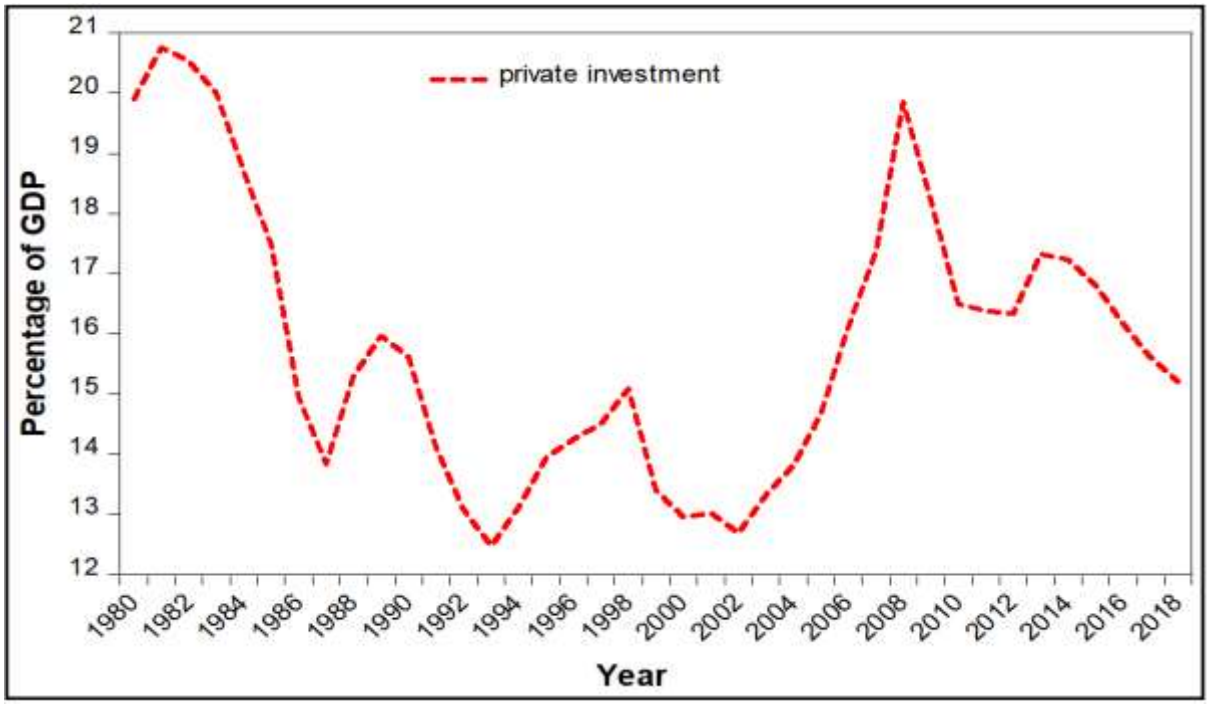


Figure 2.2: Private investment as a percentage of GDP in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

From 1980 to 1982, the level of private investment was on an upward trend, rising from 19.9% to 20.5%. However, it started to decrease from the 20.5% in 1982 to 13.8% in 1987. Private investment in 1980 was at 19.9%, and it reached its lowest in the period from 1980 to 1993, at 12.5% in 1993.

For the period 2003 to 2008, private investment as a percentage of GDP increased from 13.3% in 2003 to 19.9% in 2008. The private investment growth during this period was complemented by the decrease in real interest rates, which decreased from 8.7% to 5.8% (World Bank, 2021). As interest rates were decreasing, it was also becoming cheaper for the private sector to borrow funds from financial institutions to finance their

investment projects and activities. After 2008, private investment was fluctuating, decreasing from 19.9% in 2008 to 15.2% in 2018. However, there was also an increasing trend between 2008 and 2018. In 2012, private investment started to increase again, until 2014, when it started to decrease until it reached 15.2% in 2018. The level of private investment averaged 15.8% in the period from 1980 to 2018, while it increased from 13.1% in 1994, to 15.2% in 2018. The strategies and policies that were developed by the government to promote private sector investment since 1994 could have contributed to the increase in investment levels from 1994.

2.5 MACROECONOMIC DRIVERS OF PRIVATE INVESTMENT IN SOUTH AFRICA

The literature has pointed out several macroeconomic variables as the main determinants of private investment. These include public investment, economic growth, credit to the private sector, interest rates, inflation, and openness of the economy, among others. This section discusses these variables within the South African context.

2.5.1 Economic growth

Ever since 1980, the economic growth rate in South Africa has been fluctuating, with the highest growth rate recorded at 6.6% in 1980, and the lowest in 1992, with a growth rate of -2.1% (see Figure 2.3). The negative growth in 1992 was due to the lack of investment, which contributed to the poor economic performance (National Treasury, 1993). As Figure 2.3 shows, although economic growth picked up from 1993, another sharp decline occurred after the mid-1990s, which resulted in a decline from 4.3% in 1996, to 0.5% in 1998.

Since the recession of 2009, the country has experienced weak economic growth and has not met the target of 3% to 5% (DPE, 2015). According to the DPE (2015), gross fixed capital formation was not a priority leading up to 2008, and this resulted in slow economic growth, which had a negative impact on local industry and skills, and reduced manufacturing capabilities. Figure 2.3 provides a graphical illustration of the rates of economic growth and private investment as a percentage of GDP in South Africa from 1980 to 2018.

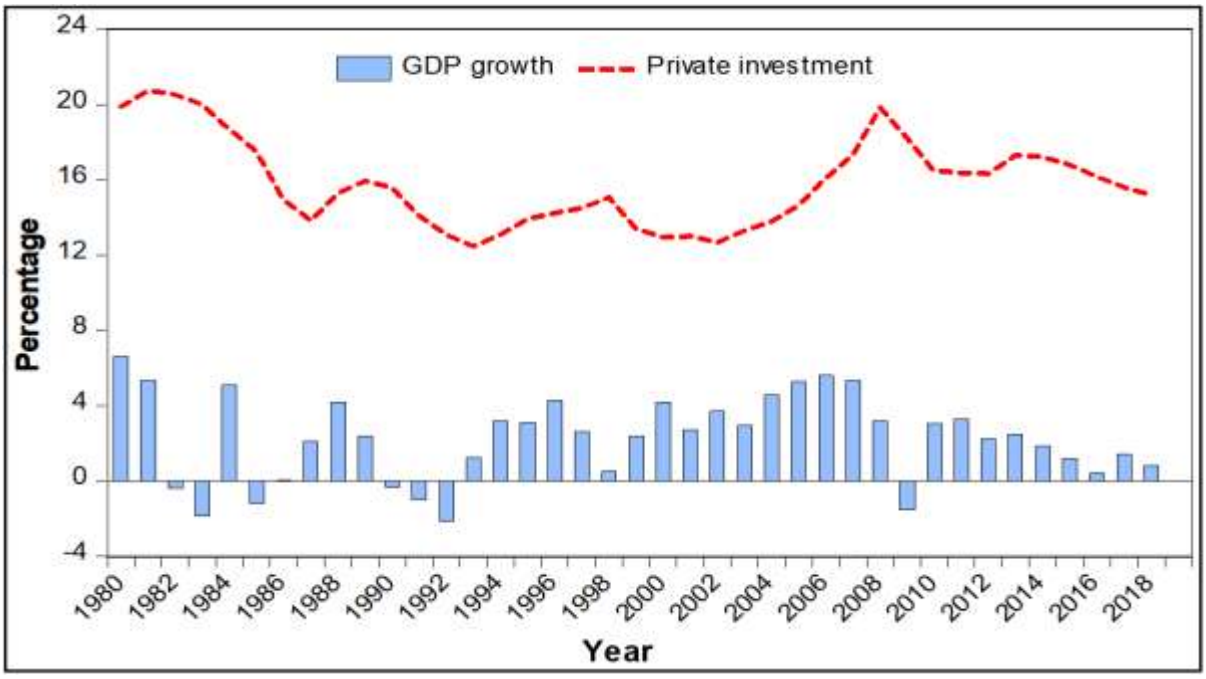


Figure 2.3: GDP growth rate and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

During the period 1980 to 1993, economic growth rate averaged 1.4%, while private investment was 16.6%. During the period 1994 to 2018, the country's economic growth was an average of 2.8%, and private investment as a percentage of GDP had an average of 15.4%. As can be seen from Figure 2.3, between 2004 and 2007, economic growth accelerated to an average of 5.2%, while private investment was at an average of 15.5%. In 2006, the economy grew by 5.6%, and 5.4% in 2007, which was higher than the AsgiSA growth target of an average growth rate of 4.5% for the period 2004 to 2009.

2.5.2 Public investment

The literature has shown that public investment can crowd in or out private investment (Ghali, 1998; Erden & Holcombe, 2005; Dash, 2016). For the period 1980 to 2018, private investment in South Africa was higher than public investment. This could be due to the government creating an environment that was supportive for the private sector through the policy strategies. Figure 2.4 provides a graphical illustration of the public and private investment as a percentage of GDP for the period 1980 to 2018.

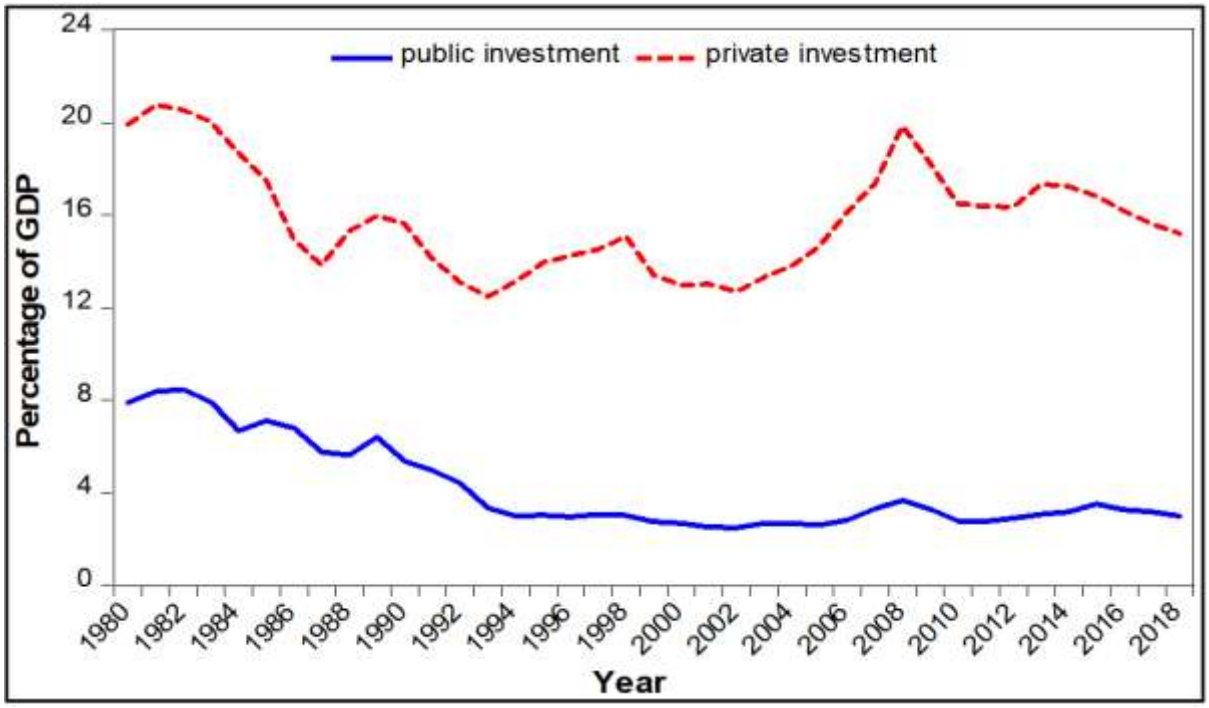


Figure 2.4: Public investment and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

In 1980, public investment was 7.9%, before increasing to 8.4% in 1981. In 1983, the public investment decreased to 7.9%, before reaching 5.6% in 1988, which was the lowest percentage in the 1980s. During this period, the government commenced with the privatisation process of the SOEs, which could explain the declining trend in public investment. In 1990, the percentage of public investment as a percentage of GDP continued to decline to 5.3%, then further to 3% in 1994. Real capital expenditure by the government declined in 1995 from 3.02% to 2.95% in 1996 (National Treasury, 1996).

For the 2000 to 2018 period, the average of public investment as a percentage of GDP was just 3% while private investment as percentage of GDP was 15.8%. In 2000, public investment was 2.7%, and in 2001, the percentage went down to 2.5%, before increasing to 3.3% in 2007, and reached 3.7% in 2008. Investment by the public sector in 2008 was the highest since 1993. The government has been working with the private sector invested in the growth of the economic infrastructure. The investment by the government in economic infrastructure was found to crowd in private sector investment (National Treasury, 2008). Public investment continued to fluctuate during the 2000s, and reached 3% in 2018.

2.5.3 Domestic credit to the private sector

Credit available to finance investment is also an important determinant of investment. The domestic credit to the private sector in South Africa has been on the rise, although at a slower rate during the period 1980 to 1990, as shown in Figure 2.5. Compared to the beginning and the end of that decade, domestic credit to the private sector improved from 54% in 1980 to 78.5% in 1990, which represents a 24.5% change.

All the policies that were implemented after the RDP, such as GEAR, AsgiSA, and the latest, the NDP, all aimed at promoting private investment in different sectors to achieve its objectives. Figure 2.5 provides a graphical illustration of the domestic credit to the private sector and private investment as a percentage of GDP in South Africa from 1980 to 2018.

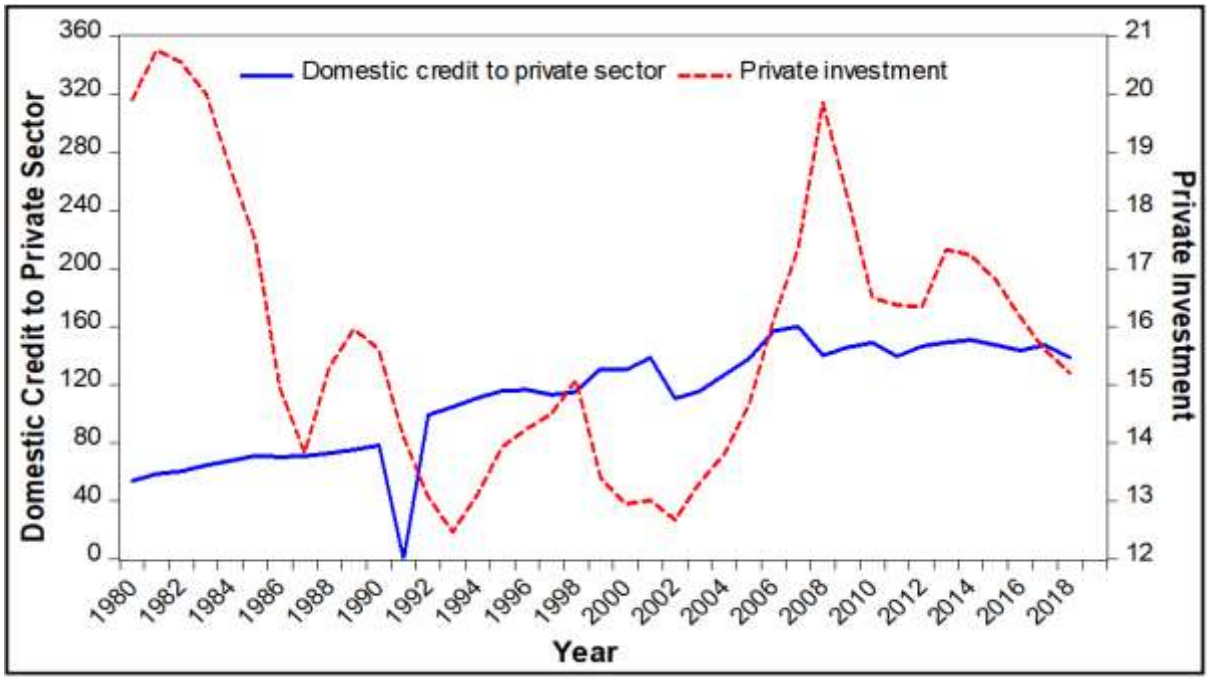


Figure 2.5: Domestic credit to private sector and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

For the private sector to invest, it needs to have access to funding, which could be reason it has been on the increase. When domestic credit to the private sector increases, the private investment also increases (see Figure 2.5). Since 2008, domestic credit continued to decrease until it started to increase again in 2012 when the NDP was introduced (see Figure 2.5). As stated in the NDP, the government

intends to support small businesses by providing finances and reducing the cost of financial services, and making it easier to access funding, especially for small and medium-sized businesses (Presidency of South Africa, 2012).

2.5.4 Real interest rate

The real interest rate is the rate of interest that has been adjusted for inflation (World Bank, 2021). It has an influence on the level of investment. When interest rates are high, it will be expensive to borrow funds from the banks to finance investment opportunities, and thus leads to a decrease in the level of investment. Figure 2.6 provides a graphical illustration of the interest rate and private investment as a percentage of GDP in South Africa from 1980 to 2018.

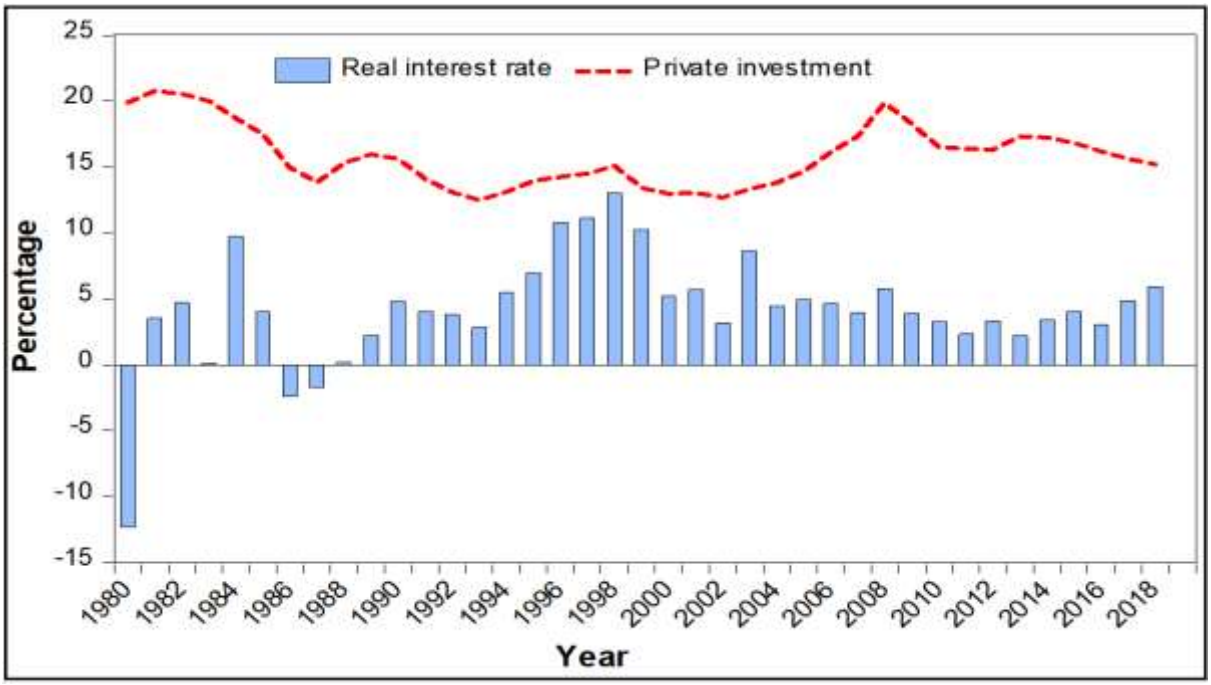


Figure 2.6: Real interest rate and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

Figure 2.6 shows that in 1980, the real interest rate was -12.3%, and that is the lowest for the duration from 1980 to 2018. It increased to 3.5% in 1981, before decreasing again to a negative percentage of -2.4% and -1.7% for the period 1986 to 1987, respectively. This was the last period in which real interest rate was negative for the period 1980 to 2018. In 1993, it started to increase from 2.8% until it started to decrease again in 1999. At the same period, private investment was 20.8% in 1981, before it started gradually decreasing to 13.8% in 1987. High real interest rates due to the decrease in inflation as well as the perception of an undervalued rand saw a

significant inflows of capital into the bond market for the period of 1997 (National Treasury, 1998b). Private investment increased to 14.5% in 1997 from 14.2% in 1996 while real interest rate also increased to 11.1% in 1997 from 10.8% in 1996.

In real terms, interest rates declined from an average of about 12% from 1995 to 1998, to about 6% in 2001 (National Treasury, 2001). By the end of 2007, the prime interest rate was 14.5% after the Reserve Bank increased the interest rate by 2% over the course of the year (Presidency of South Africa, 2007). The Reserve Bank was able to limit its interest rate increases because since 1981, the government, for the first time, became a net saver in 2006 after it had a surplus (Presidency of South Africa, 2007).

2.5.5 Inflation rate

Inflation is another determining factor of private investment. Inflation affects investment, as the returns have to keep up with the rate of inflation. Figure 2.7 provides a graphical illustration of the inflation rate and private investment as a percentage of GDP in South Africa for the period 1980 to 2018.

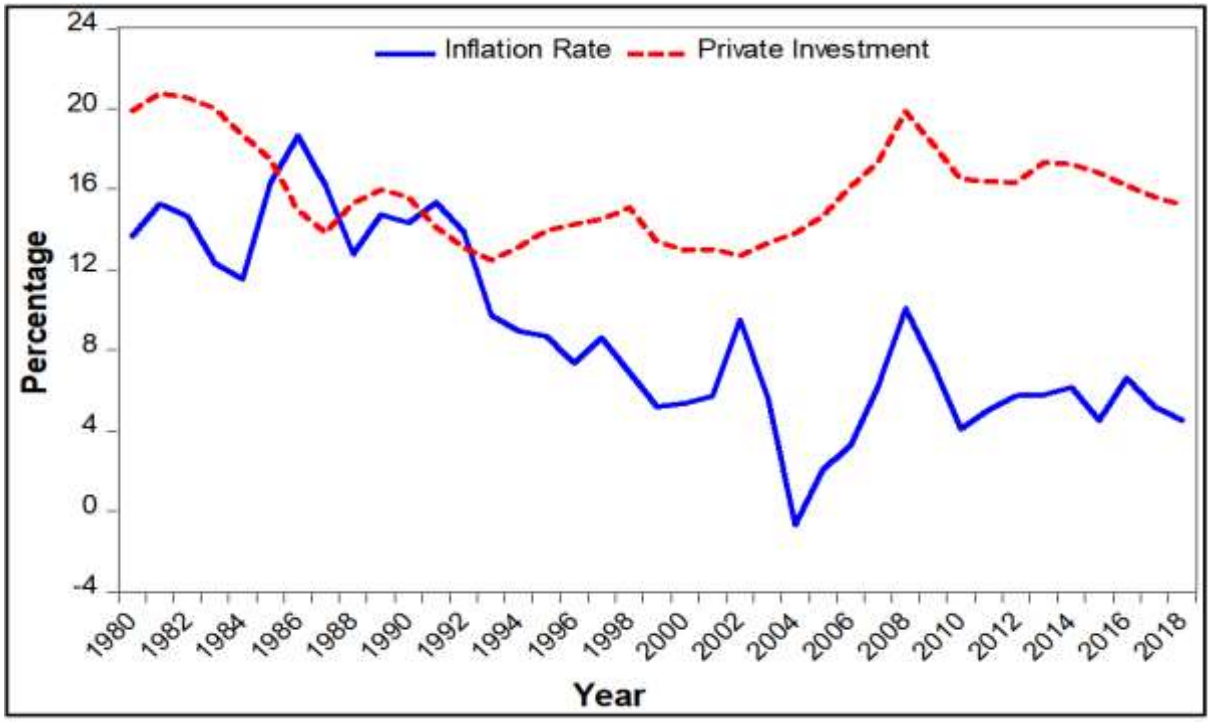


Figure 2.7: Inflation rate and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

It can be seen that when inflation was on the rise, private investment decreased for most of the years from 1980 to 2018. Inflation was 13.7% in 1980, and reached the lowest inflation rate in the 1980s at 11.5% in 1984, and then it increased to 18.7% in

1986, reaching the highest annual rate of inflation since 1980, before decreasing to 12.8% in 1988. Inflation was on a decreasing trend from 1991 to 1996, where it declined from 15.3% in 1991 to 7.4% in 1996. In 1996, inflation was at its lowest rate since 1980.

The National Treasury (1998a) stated that the decreasing trend from 1993 was because of the tight monetary policy that ensured that the depreciation of the rand had a small impact on inflation. During the period 1994 to 2018, the country's inflation rate averaged 5.8% and private investment averaged 15.4%.

The inflation for 1997 was below the GEAR forecast of 9.7% because of the strength of the rand and high real interest rates (National Treasury, 1998b). In 2000, inflation targeting was introduced in South Africa with a target range of 3% to 6%. For the period 2003 to 2006, the inflation rate was within the inflation target. However, it was above 7% for the year 2007, which was not within the 3% to 6% target of the Reserve Bank (The presidency of South Africa, 2007). The increase was largely as a result of the high prices of fuel and food that are determined by international commodity prices (Presidency of South Africa, 2007).

Consumer inflation went up from 4.5% in 2015 to 6.59% in 2016 in response to increasing prices of food and sustained increases in administered prices (National Treasury, 2016). Higher prices of food and the depreciation of the exchange rate contributed to the rate of inflation in 2016, as businesses were expected to transfer the cost of the weaker rand on to the consumers (National Treasury, 2016).

2.5.6 Trade openness

The openness of a country is important because the more open an economy is, the more it attracts foreign private investment, as it becomes easier for countries to trade goods and services with the host country. Figure 2.8 provides a graphical illustration of private investment and trade openness as a percentage of GDP in South Africa.

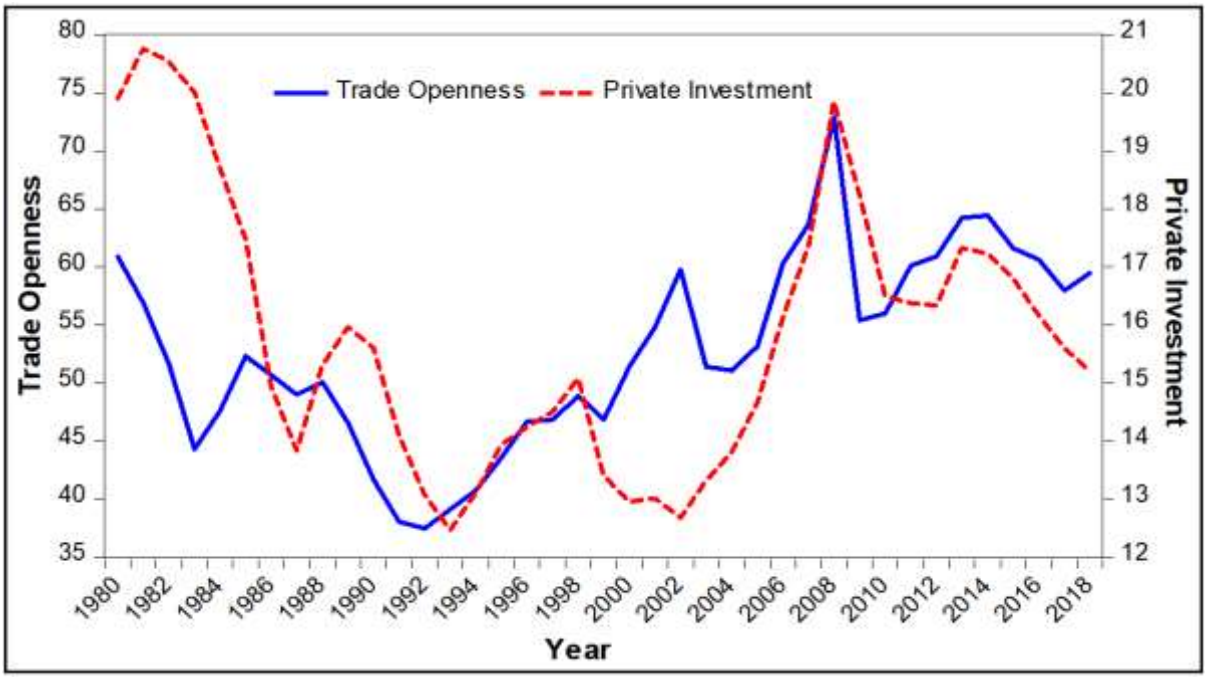


Figure 2.8: Trade openness and private investment in South Africa (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

Trade openness as a percentage of GDP commenced a downward trajectory in 1980 and reached the lowest in 1992 at 37.5% of GDP. This could be due to the period when the country faced sanctions. From 1993, before the democratic elections, trade openness started to increase again until it reached its highest level of 72.9% in 2008, the highest level since 1980. In 2009, trade openness decreased to 55.4%, from 72.9% in 2008. During the period 1980 to 1993, trade openness was at an average of 47.6%, while private investment was at 16.6%. During the period 1994 to 2018, trade openness averaged 55.7%, and private investment growth averaged 15.4%.

2.6 CONCLUSION

The chapter reviewed the trends related to the macroeconomic determinants of private investment in South Africa from 1980 to 2018. The government has adopted several policies and measures since 1994 to encourage private sector investment, job employment creation and sustainable economic growth. The policies that were discussed are the RDP, GEAR, AsgiSA, and the latest, the NDP. The government also planned to boost the involvement of the private sector in the economy through the SOE privatisation process. The government also has a PPP, which is a contract between an institution in the public sector and a private company in which the private

company provide services that are usually performed by government. In 2018, out of the total budget for the spending on infrastructure for the next three years, 2.2% of the estimated total budget was earmarked for PPP projects. During the NDP, the government intends to support small businesses by providing finances and reducing the cost of financial services and making it easier to access funding, especially for small and medium-sized businesses.

In order to encourage the type of investment that boosts economic growth and creates employment by domestic and foreign investors, the government has introduced a range of incentives in terms of capital investment and tax exemptions, such as the critical Infrastructure Programme, Black Industrialists Scheme, Export Marketing and Investment Assistance Scheme, Capital Projects Feasibility Programme and Automotive Investment Scheme, among others. For the South African economy to grow at the rate that is needed to achieve its objectives, it needs further injections in investment.

The drivers that were discussed include public investment, economic growth, credit to the private sector, interest rates, inflation and trade openness. In the 1980s, there was a decrease in investment when sanctions were imposed on the country. For the period from 1980 to 2018, it was seen that the levels of private investment in South Africa have always been higher than that of government and public corporations.

CHAPTER 3

OVERVIEW OF DOMESTIC PRIVATE SECTOR INVESTMENT IN BOTSWANA[3]

3.1 INTRODUCTION

This chapter provides an overview of the determinants, as well as the trends related to private investment in Botswana. The chapter is divided into six sections. Section 3.2 discusses the investment policies aimed at promoting investment in Botswana. Section 3.3 discusses the incentives that the government has implemented to promote private investment in Botswana. Section 3.4 reviews the trends in private investment in Botswana. Section 3.5 examines the trends related to the macroeconomic drivers of private investment, while the last section concludes the chapter.

3.2 INVESTMENT POLICY REFORMS IN BOTSWANA

Since Botswana gained independence in 1966, the government of Botswana has been working on the diversification of the economy and the development of the private sector. The Republic of Botswana (2019) stated that the new economic development strategy is the advancement of economic growth through private sector involvement. Over the years, the economic growth of the country has been based on the prolonged and rapid expansion of the mining sector, and the government has been mainly financed by the proceeds from the mining sector (Bank of Botswana, 2000).

As the government and the mining sector account for nearly half of the country's gross domestic product (GDP), the country needs to diversify its economy as it cannot depend solely on one sector (Bank of Botswana, 2000). As the mineral sector does not have the potential to contribute to fast economic growth, the government needs to

[3] This chapter produced an article entitled 'The drivers of private sector investment in Botswana: An exploratory review', which was published in *Facta Universitatis, Series: Economics and Organization*, Vol.18, Issue 5, 2021.

promote investment in other sectors of the economy to boost diversification. This was the objectives of the National Development Plan (NDP) 7 and 8 (Kgakge, 2002).

The government has been successful in this regard, as there has been a decrease in the share of the mining sector, and an increase of the non-mining sectors in the economy (Republic of Botswana, 2019). The contribution of the mining sector to GDP decreased to 18% in 2018 from 25% in 2008, while during the same period, the non-mining sectors increased from 75% to 82% (Republic of Botswana, 2019).

In order to boost economic growth, the government in Botswana has been working on the diversification of the economy, and has encouraged the private sector to invest in the economy by creating an environment that is conducive to the sector, as in the case of South Africa. According to the OECD (2005), the important features of public policy and public sector reform agenda in Botswana have been the promotion of private sector development to encourage the effective use and allocation of economic resources.

The government of Botswana has recognised the private sector as one of the key factors that drive economic growth, diversification and employment creation. The government has since formulated a number of policies and initiatives to promote the participation of the private sector in the economy (Republic of Botswana, 2019). Some of the policies that have been developed to encourage private sector investment in the economy are discussed in Sections 3.2.1 to 3.2.4.

3.2.1 Privatisation of state-owned enterprises

The privatisation of SOEs is an initiative by the government that includes the private sector in the diversification of the economy and the creation of jobs. The privatisation of SOEs in Botswana is similar to the initiative implemented by the South African government. According to Galeforolwe (2006), privatisation in Botswana is defined as including all the processes and policies that are expected to strengthen the role of the private sector in the economy. Galeforolwe (2006) further stated that the objectives of privatisation policies are to promote competition, improve efficiency and to grow the productivity of enterprises, reduce the public sector size, increase the involvement of citizens in the ownership of national assets, expand capital markets, and to encourage entrepreneurship and investment.

In efforts to implement privatisation, the government established the Public Enterprise Evaluation and Privatisation Agency (PEEPA) in 2001 to oversee the process. Since its introduction, the agency has reviewed the activities of government departments as well as that of state enterprises, and has also formulated a draft Privatisation Master Plan that will provide the guidelines for the implementation of reforms aimed at increasing the involvement of the private sector in the economy (OECD, 2005).

According to the Republic of Botswana (2009), the privatisation of SOEs is a good indicator to investors that the government has reduced its involvement in economic activities, however, there has not yet been progress in the sale of large state enterprises to the private sector.

3.2.2 Public Private Partnership

As in South Africa, the Government of Botswana adopted the Public Private Partnership (PPP) strategy in 2009, as another way to finance the government's infrastructure projects, to fast track and improve the development of infrastructure, and also to build an environment that is conducive to a stronger partnership between the public and private sectors (Ministry of Finance and Development Planning, 2009). However, the government has proceeded cautiously while exploring opportunities to collaborate with the private sector in the funding, implementation of projects and public infrastructure operations (Bank of Botswana, 2015).

Some of the major projects identified under the PPP include the Gaborone Waste Water Treatment, Zambezi Integrated Agro-Commercial Development, Strategic Oil Reserve at Tshele Hill, and the Chobe-Zambezi Water Transfer Scheme. In preparing to gain partners from the private sector, the departments responsible for these projects conducted feasibility studies of these projects. In addition, as part of the consolidation of the private sector-led development model, the government aimed to intensify the implementation of the PPP during 2019/2020 (Republic of Botswana, 2019).

3.2.3 The National Development Plan 10

Botswana's NDP 10 was established for the term from April 2009 to March 2016. It prioritised the growth of the private sector and concentrated on addressing weaknesses in investment conditions. In 2012, South Africa introduced its first NDP,

unlike Botswana which was on its tenth NDP. Similarly, both countries planned to encourage private investment through the NDP.

During the implementation of the NDP 10, the government planned to become less dependent on government spending and to promote the private sector as the driving force for economic growth (Republic of Botswana, 2009). To ensure the success of the NDP 10, the government followed a plan that aimed to support the efforts by the government and the private sector to create an environment that is supportive of the private sector, encourage increased levels of private investment by both the domestic and foreign investors, and enhance competiveness in the markets of goods and services (Ministry of Finance and Development Planning, 2013).

To develop an environment conducive for private sector involvement, the government planned to enhance the conditions of business by doing away with the negative effects of all the existing administrative, bureaucratic and regulatory weaknesses that are unfavourable to the development of the private sector (Republic of Botswana, 2009).

3.2.4 The National Development Plan 11

The NDP 11 is the first medium-term plan that stretches from April 2017 to March 2023, and that aims towards the implementation of the country's second vision - Vision 2036. The theme of NDP 11 is "Inclusive Growth for the Realisation of Sustainable Employment Creation and Poverty Eradication" (Republic of Botswana, 2017). In the case of South Africa, the vision of NDP 2030 is to remove poverty and reduce inequality. According to Republic of Botswana (2017), the theme of vision 2036 will be achieved through the implementation of six national priorities, which are to develop the sources of economic growth that are diversified, the development of human capital, social development, the use of national resources that are sustainable; the consolidation of good governance and that of national security, and the implementation of an effective monitoring and evaluation system.

As stated in the NDP 11, the plans to stimulate growth and create opportunities that will create jobs in the economy will be achieved through the development of diversified sources of economic growth through initiatives such as: Beneficiation, Cluster Development, Special Economic Zones (SEZ), Economic Diversification Drive (EDD) and Local Economic Development (LED).

The government plans to continue to grow the economy during the NDP 11 through mineral beneficiation to maximise the value addition from minerals, and to drive beneficiation to stimulate the promotion of the private sector (Republic of Botswana, 2017). Through the initiative of SEZ, the government will promote both the local and FDI, and the investments will contribute to the fast development of the economy, along with the creation of sustainable employment opportunities (Republic of Botswana, 2017).

The aim of LED is to develop an enabling environment for local investors, and to promote SMMEs and major businesses. The success of this initiative depends on investment from the private sector, access to external markets and the provision of infrastructure (Republic of Botswana, 2017).

3.3 INCENTIVES FOR PRIVATE INVESTMENT IN BOTSWANA

The Government of Botswana has, over the years, as in South Africa, adopted a number of schemes aimed at providing financial support to investments by private and public sector enterprises (Bank of Botswana, 2001). The objectives of the schemes include the diversification of the economy (Bank of Botswana, 2001). According to the Bank of Botswana (2001), some of the schemes that have been implemented to provide financial assistance to the private sector include the Financial Assistance Policy (FAP) and the Small, Medium and Micro Enterprises (SMMEs) scheme.

The FAP was established in 1982, and its aim was to encourage investment and employment opportunities by providing financial grants to new or expanding enterprises that have been approved (Bank of Botswana, 2001). According to Valentine (1993), the main objectives of the FAP were as follows: to facilitate prompt industrialisation; to assist with the diversification of the economy from being dependent on mining and non-cattle and non-traditional agricultural projects; to promote industrialisation in rural areas; to promote the employment of unskilled labour that is sustainable and that contributes to addressing the country's employment problem, among others.

The SMME scheme was established in 1999, and it was used to provide subsidised loans to approved borrowers. According to the OECD (2005), the specific objectives of the SMMEs policy include the promotion of citizen empowerment and

entrepreneurship; the diversification of the economy; the promotion of exports; encouraging the development of a competitive and sustainable SMME community; and the creation of sustainable employment opportunities, among others.

Due to the shortcomings of the schemes, both the FAP and SMME were discontinued and replaced with the Citizen Entrepreneurial Development Agency (CEDA), which provides subsidised loans to commercially viable enterprises, and runs a venture capital scheme (Bank of Botswana, 2001). The venture capital fund will be made available for joint ventures between domestic and foreign investors (Bank of Botswana, 2001). According to the Bank of Botswana (2015), the objectives of the CEDA are to:

- Provide support for business development through a number of funding instruments;
- Target agro-business, services, property and manufacturing by way of the provision of subsidised loans, and assist with the facilitation of joint ventures;
- Promote citizen entrepreneurship, empowerment and the diversification of the economy;
- Encourage the development of competitive and sustainable citizen enterprises; and
- Create sustainable employment opportunities.

3.4 PRIVATE INVESTMENT TRENDS IN BOTSWANA

It has been found that, similar to the situation in South Africa, private investment in Botswana was higher than public investment for the period from 1980 to 2018. The government has created an environment that is supportive of the private sector to invest in the economy.

In 1981, total investment as a percentage of GDP was 35.8%. Private sector investment accounted for 25.1% of total investment, while the public sector accounted for 10.7% of total investment. In 2018, the total investment was 30.2%, with the private sector accounting 23.1% towards total investment and the public sector just 7.1%.

Figure 3.1 provides a graphical illustration of the public, private and total investment in Botswana as a percentage of GDP from 1980 to 2018.

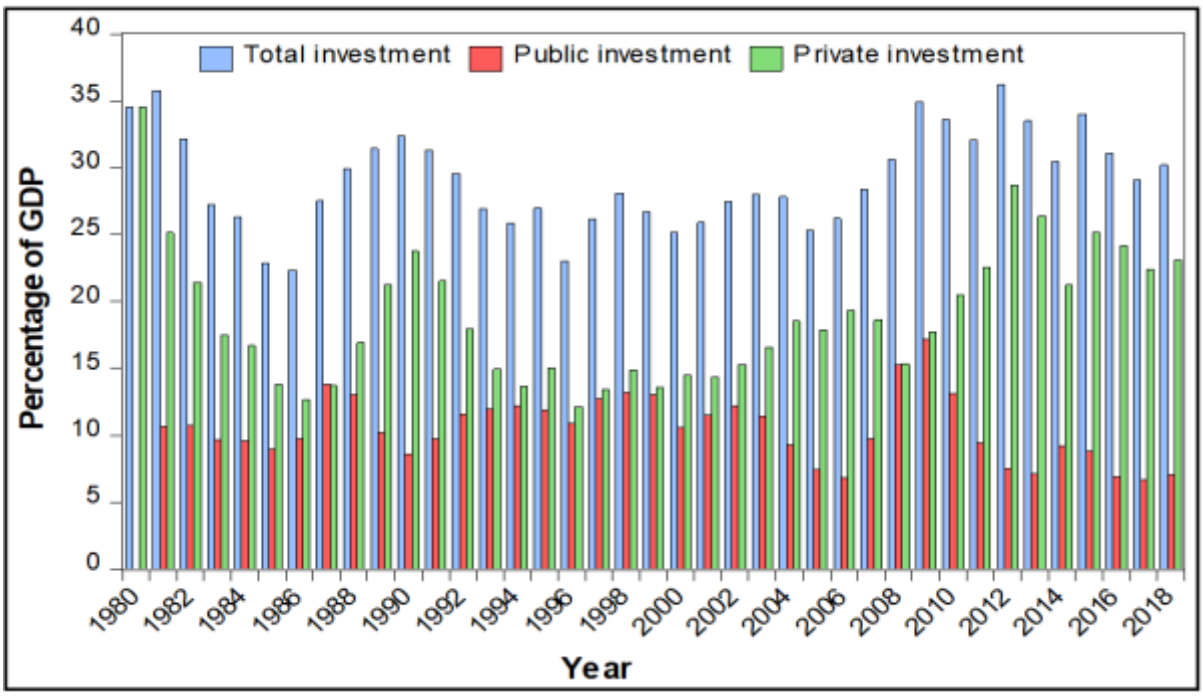


Figure 3.1: Public, private and total investment as a percentage of GDP in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

Private investment as a percentage of GDP declined from 34.5% in Botswana, to 23.1% in 2018; while in South Africa, it decreased to 15.2% in 2018 from 19.9% in 1980 (World Bank, 2021). Private investment in Botswana has been fluctuating since the 1980s, and averaged 18.9% for the period from 1980 to 2018. It declined to 12.6% in 1986 from 34.5% in 1980, before increasing again to 23.8% in 1990. After 1990, it decreased again to below 15% for most of the years in the 1990s. The private sector investment level as a percentage of GDP declined to 12.1% in 1996, from 23.77% in 1990. For the period from 1992 to 2009, the performance of private investment as a percentage of GDP was less than 20% per annum. However, there was an improvement in the private sector in 2010 when investment as a percentage of GDP rose to 20.5%.

Figure 3.2 provides a graphical illustration of the trends in private investment in Botswana as a percentage of GDP from 1980 to 2018.

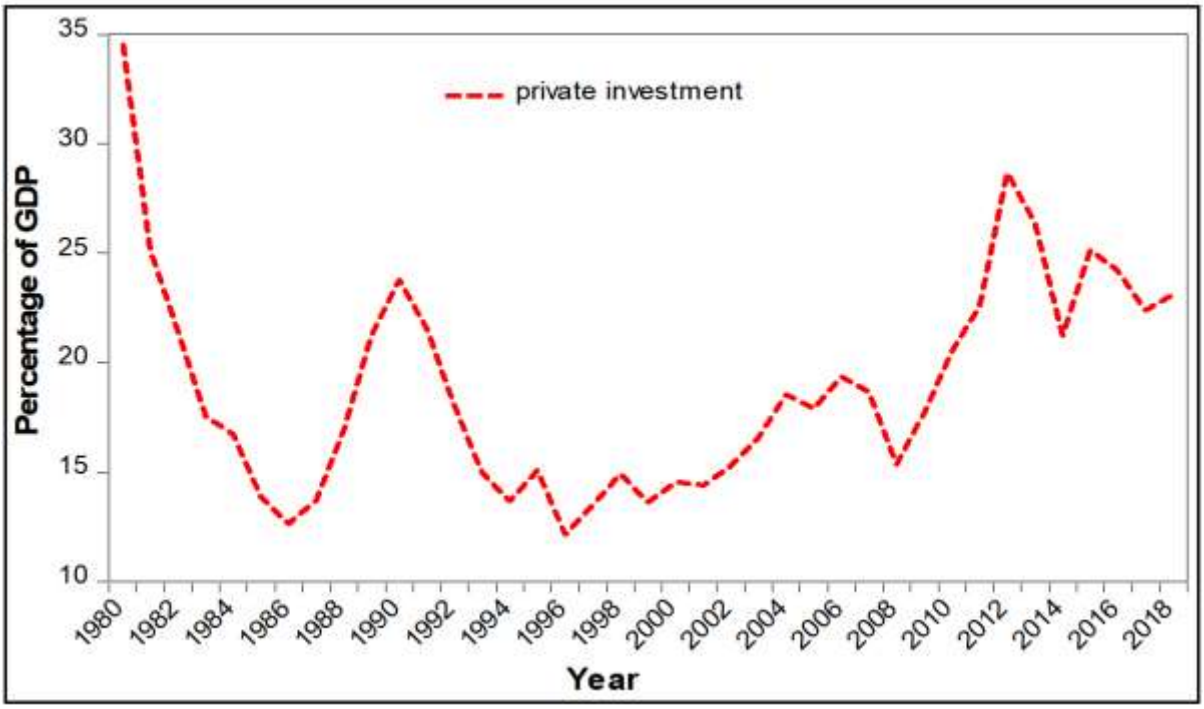


Figure 3.2: Private investment as a percentage of GDP in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

Private investment increased to 18.5% in 2004, from the 14.4% in 2001. However, private investment decreased before the 2008 financial crisis that affected many economies. Private investment declined to 15.3% in 2008, from the 18.6% in 2007. From 2009, investment by the private sector started to increase again, and it reached 28.7% in 2012, before decreasing to 21.2% in 2014. In 2015, it was at 25.2%, before it decreased to 23.1% in 2018.

3.5 MACROECONOMIC DRIVERS OF PRIVATE INVESTMENT IN BOTSWANA

The literature has shown that several macroeconomic variables, including public investment, economic growth, credit to the private sector, inflation, interest rates and trade openness, among others, are the main determinants of private investment. This section discusses the determinants within the context of Botswana, as was done for South Africa.

3.5.1 Economic growth

The literature shows that economic growth has a positive impact on private investment (Karagoz, 2010; Nainggolan, Ramli, Daulay & Rujiman, 2015). As in South Africa, the

economic growth rate in Botswana fluctuated from 1980 to 2018. The highest growth rate recorded in South Africa was 6.6% in 1980, and the lowest was in 1992, with the growth rate of -2.1% (World Bank, 2021*)*. In Botswana, the highest growth rate was recorded at 19.4% in 1988, and the lowest was in 2009, with a growth rate of -7.7%.

Figure 3.3 provides a graphical illustration of the rates of economic growth and private investment as a percentage of GDP from 1980 to 2018 in Botswana.

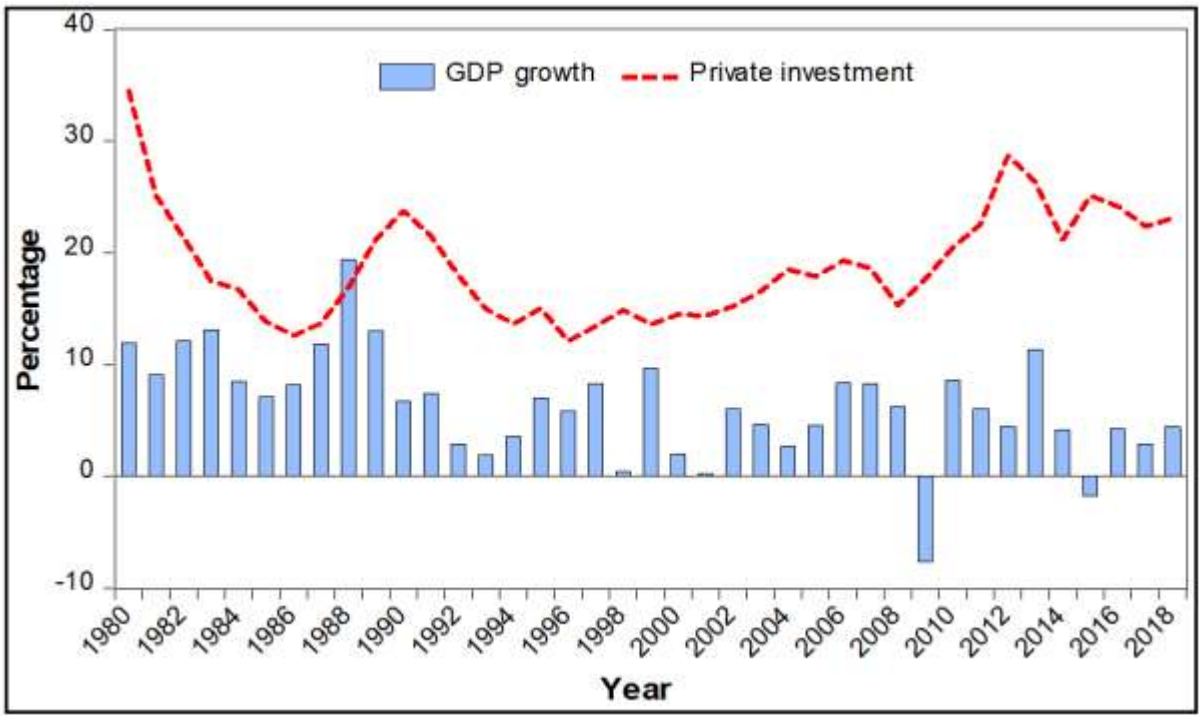


Figure 3.3: GDP growth and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

The sharp decrease to 0.4% in 1998, from the 8.3% in 1997, could have been due to the Asian Financial Crisis that affected many economies. After the financial crisis, the economy of Botswana increased to 9.7% in 1999, before it slowed down to 0.3% in 2001. The main reason for the increased growth in 1999 was the increased activity in the mining sector (Bank of Botswana, 2000). After the weak economic growth in 2009, the country experienced strong economic growth, and there was a sharp increase to 8.6% in 2010, until it declined to -1.7% in 2015.

3.5.2 Public investment

Investment by the public sector has a crowding in or out impact on private investment. For the period from 1980 to 2018, private investment surpassed investment by the government sector in Botswana. When compared with South Africa, Botswana has a

higher level of public investment, for example, public investment as a percentage of GDP averaged 4.2% for South Africa, while Botswana averaged 10.3% for the period 1980 to 2018 (World Bank, 2021).

Figure 3.4 provides a graphical illustration of the private and public investment as a percentage of GDP.

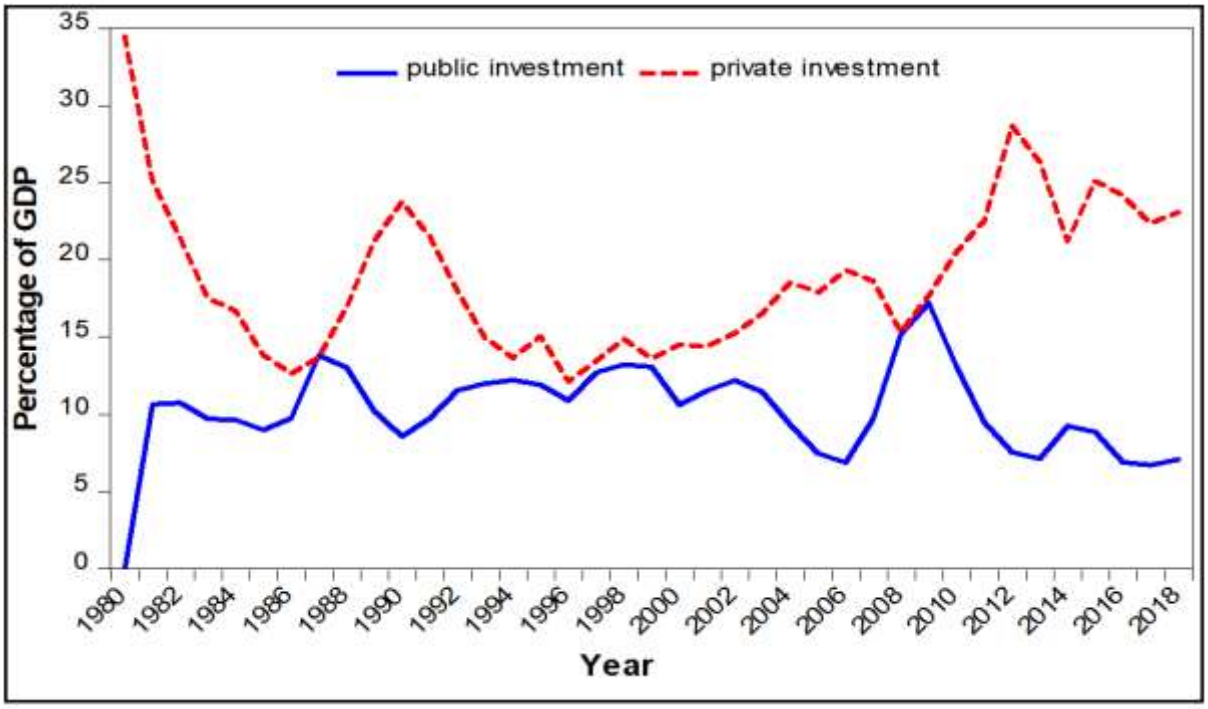


Figure 3.4: Public investment and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

While there was an overall continuous decrease in private investment from 1990 to 1994, public sector investment showed an increasing trend. Investment by the public sector increased to 13.7% in 1994, up from 8.6% in 1990. According to Bank of Botswana (2000), there was an increase in the share of gross fixed capital formation in the mid-1990s, which indicated the increased pace of the government's investment programme. However, public investment as a percentage of GDP decreased to 10.6% in 2000, down from 13.2% in 1998. The share of gross fixed capital formation decreased in the period 1999/00, as a result of the slower real growth rates of government development spending (Bank of Botswana, 2000).

In 2003, public investment decreased to 11.5%, from 12.2% in 2002, and continued to decline until 2006. In 2007, it increased to 9.8%, until it reached 17.2% in 2009, before

it declined again to 7.1% in 2013. In 2014, it increased to 9.2% from 7.1% in 2013, however, it continued to decline to 7.2% in 2018.

For the period 2008 to 2009, both public investment and private investment averaged 15% in 2008 and 17% in 2009, respectively. Public investment was below 10% from 2014 to 2018, while private investment was above 20% for the same period.

3.5.3 Domestic credit to the private sector

The credit available to finance investment is another determining factor of level of private investment. In Botswana, as shown in Figure 3.5, from 1980 to 1997, there was an upward and downward trend of domestic credit to the private sector. It declined to 9.7% in 1997 from 11.3% in 1980. From 1998, it started to increase, and from 2001 until 2018, as a percentage of GDP, it exceeded the level of investment by the private sector.

Figure 3.5 provides a graphical illustration of the private investment and domestic credit to the private sector as a percentage of GDP from 1980 to 2018 in Botswana.

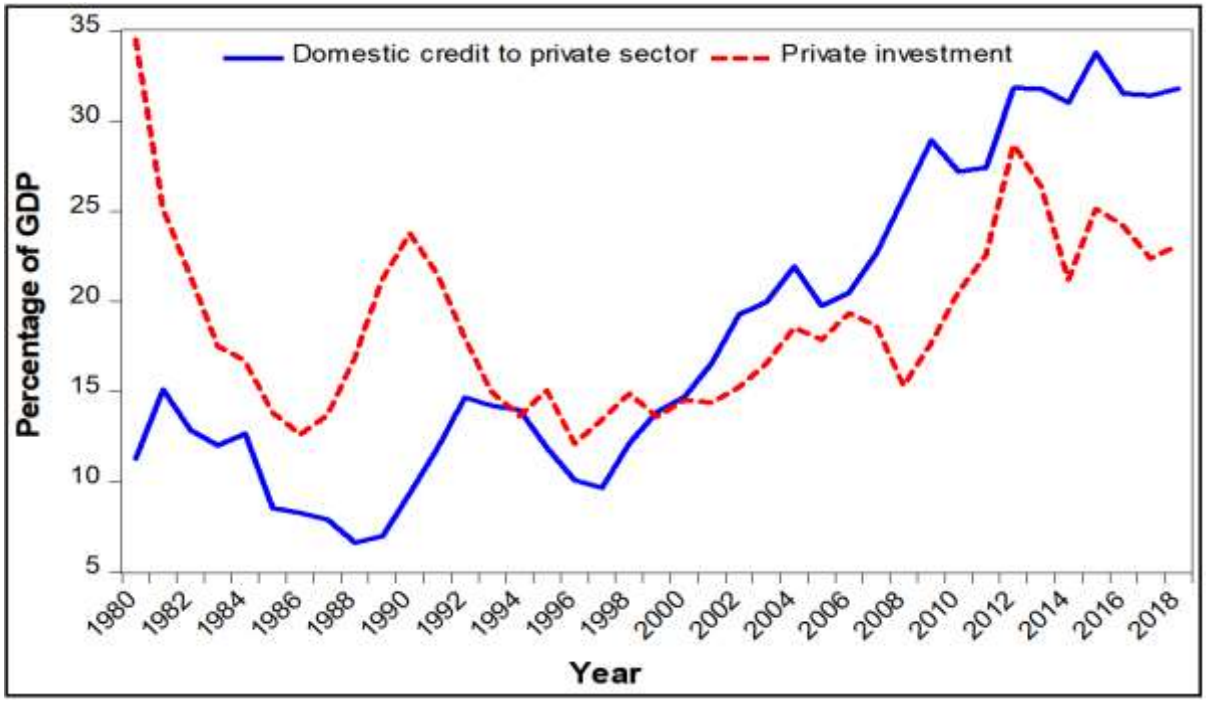


Figure 3.5: Domestic credit to private sector and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

The credit to the private sector increased to 25.8% in 2008 from 22.7% in 2007. It continued to increase to 28.9% in 2009, until there was a slight decrease to 27.2% in 2010 (World Bank, 2021).

The government made finances available to SMEs through its various enterprise development programmes. The trend shows that there is a positive relationship between credit to the private sector and private investment. When domestic credit to the private sector falls, private investment also declines, and when it increases, private investment also increased. The reason could be because the private sector has to borrow funds from financial institutions to finance their businesses and investments.

3.5.4 Real interest rate

Similar to that found in South Africa, the real interest rate in Botswana showed fluctuation trends from 1980 to 2018. In 1980, the interest rate was -1.6%, and in 2018, it was 5.3%.

Figure 3.6 provides a graphical illustration of the real interest rate and private investment as a percentage of GDP trends for the period from 1980 to 2018 in Botswana.

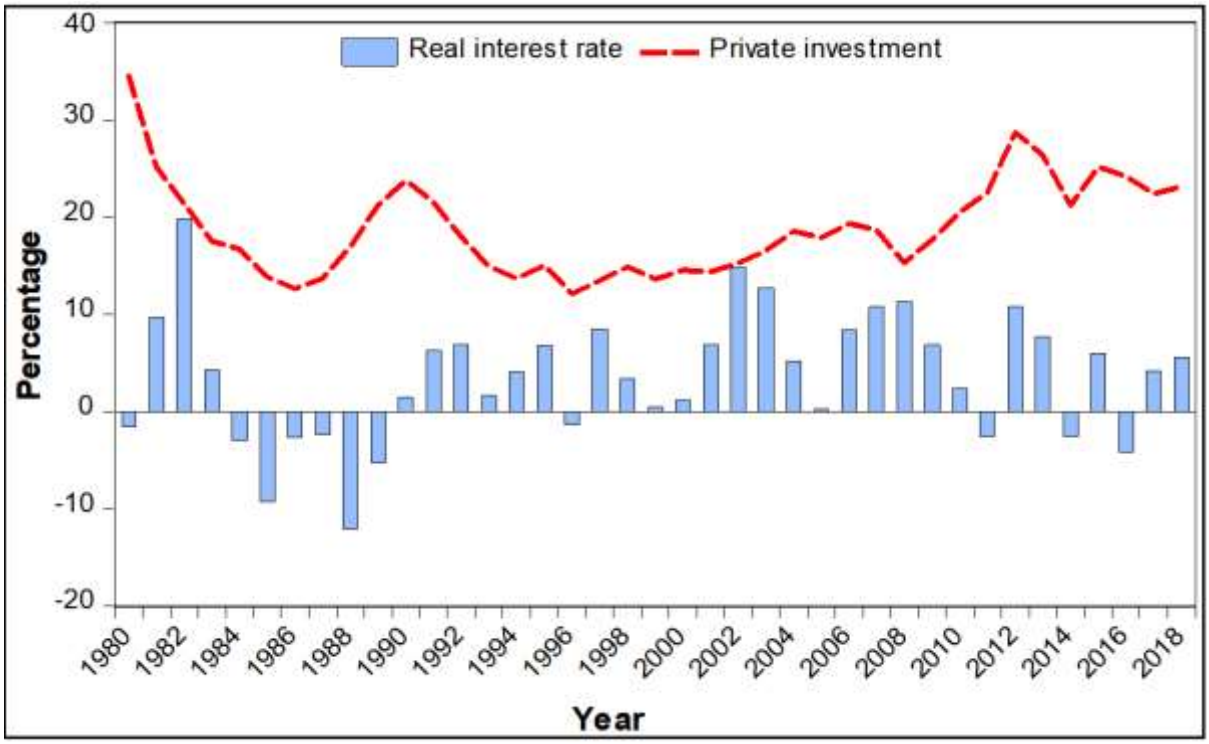


Figure 3.6: Real interest rate and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

In 1980, real interest rate was -1.6%, before a sharp increase to 19.8% in 1982, which was the highest rate for the period from 1980 to 2018. In 1985, there was a sharp decline from 19.8% in 1982 to -9.3 in 1985. The trend shows that for the period in the late 1980s (from 1984 to 1989), the real interest rate was negative. In 1989, the real interest rate continued to increase to 6.9% in 1992, before it started fluctuating again. In 1996, it was at a negative rate of -1.4%, before increasing to 8.5% in 1997. In 1997, it started to decrease from 8.5% to 0.5% in 1999.

The real interest rate increased to 14.8% in 2002, from 1.1% in 2000, before decreasing to 0.2% in 2005, and then increasing to 11.3% in 2008, before declining again to -2.6% in 2011 (see Figure 3.6). In 2012, there was a sharp increase to 10.8% from the -2.6% in 2011. The increase in the real interest rate in 2012 was due to the decrease in inflation (Bank of Botswana, 2012). Nevertheless, in 2013, it declined to 7.7%, and continued on the downward trend until 2018, when it was at 5.3%. During the period 2013 to 2018, there were some years, such as 2014 and 2016, when interest rates were negative at -2.6% and -4.2%, respectively.

3.5.5 Inflation rate

Inflation is another determining factor to the level of private investment. The Botswana Bank monetary policy's primary objective is to achieve price stability, which has been defined as a sustainable level of inflation that is within the medium-term target of between 3% and 6% (Bank of Botswana, 2017). This is the same for South Africa, where the inflation target is between 3% and 6%.

Figure 3.7 provides a graphical illustration of the trends of inflation rate and private investment as a percentage of GDP in Botswana from 1980 to 2018.

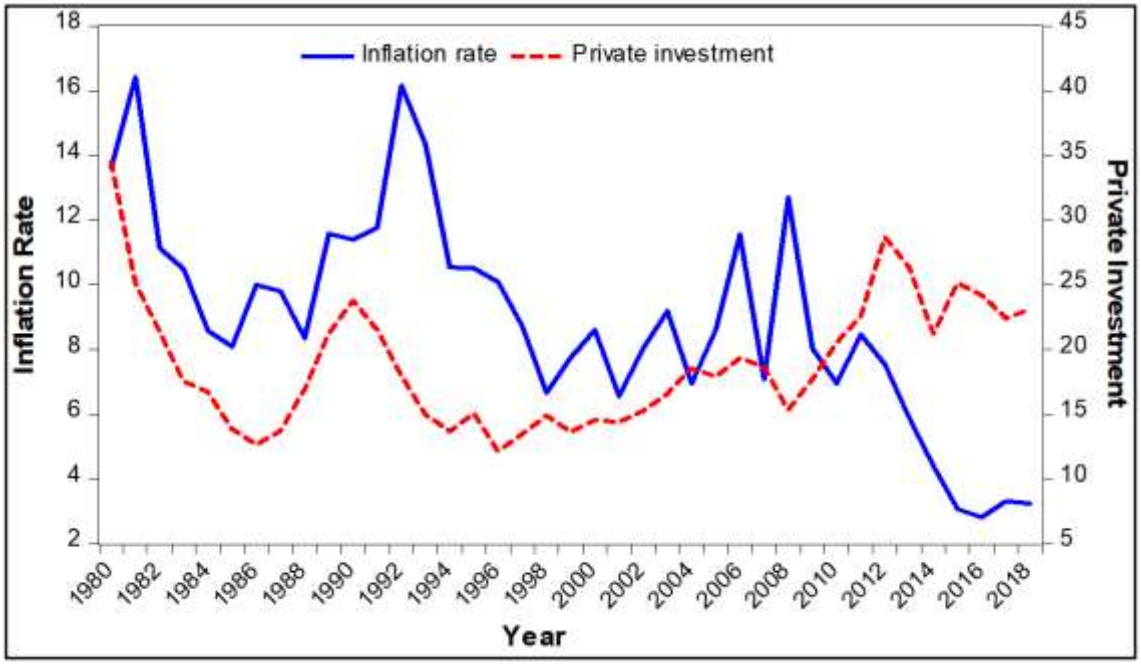


Figure 3.7: Inflation rate and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

Inflation was at 13.6% in 1980, and reached the lowest inflation rate in the 1980s at 8.1% in 1985, and then it increased to 10% in 1986, before decreasing to 8.4% in 1988. In 1992, the inflation rate increased to 16.2%, which is the highest annual rate of inflation since 1980. After 1992, there was a continuous decline in the inflation rate until 1998. The inflation rate was 6.7% in 1998, before an increase to 8.6% in 2000, before it declined to 6.6% in 2001.

After 2001, there was an increase to 9.2% in 2003. According to Bank of Botswana (2000), the dynamics that drove inflation for the period 2000 include the increase in the prices of fuel, which led to an increase in the costs of production. The decline in 2001 was as a result of an abatement of external inflationary pressures, reinforced by the tight monetary policy stance that was maintained throughout the year (Bank of Botswana, 2001).

In 2007, the annual inflation objective was set at 4–7% by the Monetary Policy Statement (MPS), however, the inflation rate exceeded 7% due to increases in the prices of international oil, and the consequent cost increases in imported foodstuffs and petroleum products (Bank of Botswana, 2007). Inflation declined to 7.1% in 2007, from 11.6% in 2006, before increasing again to 12.7% in 2008. Inflation decreased from 12.7% in 2008 to 6.9% in 2010. For the period 2013 to 2018, the inflation rate

was within the target of 3% and 6% (see Figure 3.7); but decreased to 3.2% in 2018, down from 5.9% in 2013.

3.5.6 Trade openness

The trade openness of a country is important because the more open an economy is, the more it attracts foreign private investment, as it becomes easier for countries to trade goods and services with the host country. As in the case of South Africa, Botswana has a relatively open economy, and the ratio of imports plus exports to GDP for the period 1980 to 2018 has exceeded 70% in Botswana.

Figure 3.8 provides a graphical illustration of the private investment and trade openness as a percentage of GDP in Botswana from 1980 to 2018.

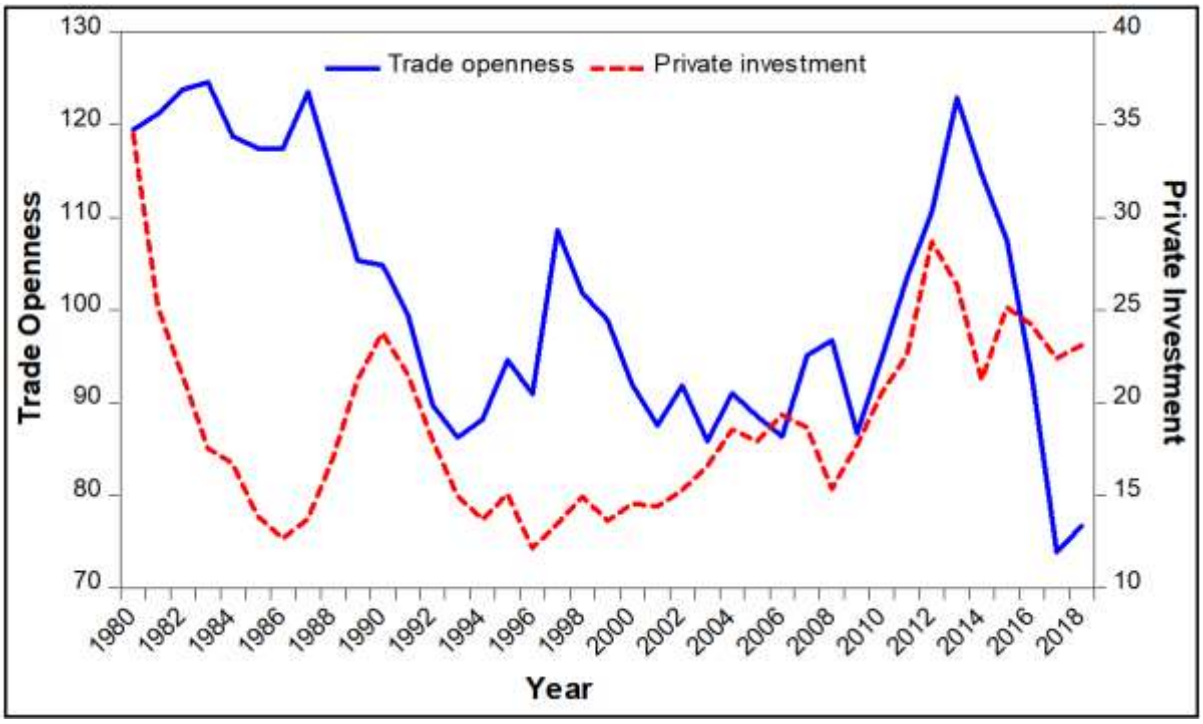


Figure 3.8: Trade openness and private investment in Botswana (1980-2018)

Source: Own compilation from World Bank Development Indicators (2021)

In the early 1980s, there was a continuous increase of trade openness to 124.6% in 1983 from 119.5% in 1980. However, from the late 1980s to early 1990s, there was a decrease in trade openness measured by the ratio of imports plus exports to GDP. The level of trade openness decreased to 86.2% in 1993, from 123.6% in 1987. In 1994, trade openness started to increase again to 94.6% in 1995.

The improvement of Botswana's trade openness during this period coincided with interventions in the economy that introduced measures allowing a more liberal trade regime (Malefane & Odhiambo, 2016). In 1997, trade openness increased to 108.6%, up from the 91% in 1996, before the continuous decline to 87.5% in 2001.

Trade openness in the 1990s and 2000s was lower than in the 1980s. According to Malefane and Odhiambo (2016), the decrease in trade openness in Botswana in the 1990s corresponded with the decreasing share of exports in the agriculture sector. Botswana's trade openness declined to 86.7% in 2009, down from 96.7% in 2008. However, the country recovered after 2009, and trade openness increased to 122.6% in 2013, from the 86.7% in 2009. After 2013, there was a continuous decline until 2017, when it decreased to 73.9% from 123% in 2013, then increased to 79.5% in 2018.

3.6 CONCLUSION

This chapter discussed the policies and incentives provided by the government in Botswana to encourage the participation of the private sector in the economy, as well as to increase the level of private investment. The focus of the government has been on the diversification of the economy and the development of the private sector. The policies include public private partnerships, privatisation of SOEs, and other initiatives outlined in the NDP 11, which include local economic development, special economic zones, cluster development and beneficiation. The privatisation of the SOEs is an initiative by the government that includes the private sector in the diversification of the economy and the creation of jobs. As in South Africa, the Government of Botswana, adopted the Public Private Partnership as another way to finance the government's infrastructure projects to fast track and improve the development of infrastructure and also to build an environment that is conducive to a stronger partnership between the public and private sectors.

The Government of Botswana has also implemented a number of schemes aimed at providing financial assistance to the private sector, as is the case in South Africa. The schemes include the FAP which was established in 1982 with the aim of providing grants to new or expanding enterprises that have been approved, and the SMME scheme which was established in 1998 to provide subsidised loans to approved borrowers. However, both the FAP and SMME have been discontinued and replaced with the CEDA which also provides subsidised loans to businesses.

The macroeconomic drivers of private investment in Botswana during the period 1980 to 2018 were also reviewed in this chapter. The drivers that were discussed include public investment, economic growth, interest rates, credit to the private sector, inflation and trade openness. As in South Africa, since 1980, private sector investment in Botswana has always been higher than that of the public sector.

CHAPTER 4

OVERVIEW OF DOMESTIC PRIVATE SECTOR INVESTMENT IN MALAWI[4]

4.1 INTRODUCTION

This chapter discusses the determinants of, and trends in, private investment in Malawi. Section 4.2 discusses the investment policies and strategies to encourage investment, especially in terms of the private sector. Section 4.3 discusses the incentives to promote private investment, while Section 4.4 discusses the trends in private investment in Malawi. Section 4.5 examines the trends related to the macroeconomic determinants of private investment in Malawi, and lastly, Section 4.6 presents the conclusion of the chapter.

4.2 INVESTMENT POLICY REFORMS IN MALAWI

The government has, since its independence in 1964, addressed many development issues, and during the 1960 and 1970s, its approach to development planning was more focused on state intervention, however, it also allowed private sector enterprises to develop (Government of Malawi, 2000). However, private investment was crowded out by the government through the allocation of domestic bank credit, and other enactments of Acts and regulations that made it almost impossible to set up private investments (Makuyana & Odhiambo, 2014).

The government has now realised that in order to achieve sustainable economic growth and productive jobs, the level of investment has to increase. They have, over the years, developed policies and plans that emphasise private sector development to achieve sustainable economic growth. The policies and incentives that have been developed to promote investment by the private sector are discussed in Sections 4.2.1 to 4.2.6.

[4] This chapter produced an article entitled 'A Review of Private Sector Investment and Related Policies: The Case of Malawi', which was published in *Euroeconomica*, Vol. 40, Issue 2, 2021.

4.2.1 Privatisation of State-owned Enterprises

As in South Africa and Botswana, the government of Malawi has also implemented the privatisation of SOEs as a way to involve the private sector in participating in the development of the economy. The privatisation of SOEs is defined as the transfer of ownership to the private sector from the government, and it has been a major policy instrument in private enterprise development in developed and developing countries since the early 1980s (Chirwa, 2000). The privatisation of SOEs in Malawi was divided into two phases. The first phase from 1984 to 1994 resorted under the structural adjustment programmes of the World Bank and International Monetary Fund (IMF) (Makuyana & Odhiambo, 2014).

The first phase of privatisation was supported under the first six structural adjustment loans provided to Malawi by the World Bank (Chirwa, 2000). During the first phase, there was restructuring of the SOEs and the parastatal reform strategies, with the aim of improving the effectiveness of government institutions. Their contribution to GDP included a review of corporate objectives, the introduction of performance-related incentives, and increases to the autonomy of management in the recruitment and firing of employees (Makuyana & Odhiambo, 2014). In the first phase, several estates, consisting of 13 non-manufacturing enterprises and 11 manufacturing enterprises held by ADMARC and MDC were privatised by the end of 1992, and the 11 privatised manufacturing enterprises were among the 52 manufacturing SOEs (Chirwa, 2000).

The second phase of privatisation started in 1996, with the seventh structural adjustment loan under the Fiscal Restructuring and Deregulation Programme (Chirwa, 2000). During the second phase, the government identified more than 150 state enterprises, and more than 15 major privatisation activities took place between 1993 and 1998 (Chirwa, 2000). The Privatisation Act that was approved in 1996, also established the Privatisation Commission to manage and control the privatisation of public enterprises in Malawi.

In the second phase of privatisation, 36 public enterprises were privatised by 1999, and 62 public enterprises were privatised by 2004 (Makuyana & Odhiambo, 2014). However, according to Chirwa (2005), the privatisation of SOEs through the National Privatisation Programme was suspended in 2001 due to a lack of substantial benefits.

4.2.2 The Malawi Economic Growth Strategy of 2004-2008

The Malawi Economic Growth Strategy (MEGS) was a medium-term strategy for the period 2004 to 2008. It was formulated in close cooperation with the private sector (Government of Malawi, 2004). In order to boost the economic growth, the government focused on strategies that would not require the government to increase its spending, but through the development of policies that would encourage investment by the private sector (Government of Malawi, 2004).

During this period, the government estimated that the economic growth would grow to over 5% by 2005, and it had to improve the environment for the private sector to conduct business (Government of Malawi, 2004). Gross fixed capital formation increased from 12.3% in 2004, to 21.5% in 2008, as a percentage of GDP, while private sector investment as a percentage of GDP, increased from 5.36% in 2004 to 14.3% in 2008, and the GDP growth increased from 5.4% in 2004 to 7.6% in 2008 (World Bank, 2021).

Investment by the private sector was needed to enable the government to achieve its objectives. However, the government noticed that there were still constraints related to the private sector. Some of the constraints included the poor macroeconomic conditions; poor infrastructure; an inefficient tax and incentive system; low human resource base and skills; weak cooperation between the private and public sectors, and the supply of utilities such as water and electricity was unreliable and the cost was high (Government of Malawi, 2004).

In addition, there were sectoral constraints that affected investment in the country, such as the following: the current incentives are insufficient to compensate for the high cost structure of the economy; the incentives offered to local investors are not sufficient; the waiver for the corporate tax favours new investors over existing firms that are in the same business; the current incentives are found to be unsuitable for some of the priority sectors such as mining and tourism; the process to obtain approval for the investment incentive is slow and not transparent; and the local market is small compared to that of other countries (Government of Malawi, 2004).

4.2.3 Malawi Growth and Development Strategy of 2006-2011

The Malawi Growth and Development Strategy (MGDS I) was a medium term strategy from 2006-2011, and it built on the MEGS, which was focused more on the need to create a favourable environment for private sector investment to encourage economic growth (Government of Malawi, 2006). The main aim of the MGDS was to decrease the level of poverty in the country through sustainable economic growth and infrastructure development (Government of Malawi, 2006). While Malawi has the MGDS strategy, South Africa and Botswana have the NDP, which has the same objectives of reducing poverty in the respective countries.

During the MGDS I, the government aimed to achieve a stable environment with low inflation rate, lower interest rates, stable and non-volatile exchange rates, sustainable domestic and external debt (Government of Malawi, 2006). Lower interest rates were needed to provide finance access to the private sector for those who needed to borrow funds. The MGDS budget framework was supposed to develop an environment that was conducive for the development of the private sector and to improve the economic infrastructure, which includes roads, energy, water and telecommunication (Government of Malawi, 2006).

The private sector was identified as the driver of economic growth by the government. However, the private sector in the country is not well developed and investment by the private sector has been low, with an average of around 3.0% of GDP, which has hindered its ability to diversify the economy (Government of Malawi, 2006). Some of the limitations that have contributed to the low levels of private investment include low investor confidence, poor management and the limited domestic market (Government of Malawi, 2006). Therefore, the government needed to focus on creating an environment that is conducive for the private sector to grow and invest.

In order to achieve sustainable economic growth, the government aimed to increase investment by domestic and foreign investors in the productive sectors. The government expected to achieve increased growth in business enterprises that can contribute positively to economic growth and increased domestic market supply; increased investment by foreigners investors; and improved competitiveness of the private sector at the end of the MGDS I (Government of Malawi, 2006).

During the MGDS I, the average GDP growth was 7.5%, compared to the target of 6% that was projected (Government of Malawi, 2011).

4.2.4 The Malawi Growth and Development Strategy of 2011-2016

The Malawi Growth and Development Strategy of 2011-2016 (MGDS II) was a medium term strategy for Malawi from 2011–2016, and its objective was to continue reducing poverty through sustainable economic growth and infrastructure development after the MGDS I (Government of Malawi, 2011). The government of Malawi has seen that achieving a sustainable economic growth can lead to the elimination of poverty and improving the living standards of its people.

During the MGDS II, the government continued to implement interventions aimed at ensuring sustainable economic growth. According to the Government of Malawi (2011), in order to achieve this, the emphasis would be on maximising the contribution of the sectors that have the potential to grow, such as agriculture, tourism and mining, while at the same time, creating an environment that is conducive for the participation and development of the private sector; promoting the creation of jobs; empowering rural communities; ensuring that there is equitable access to land; and promoting the sustainable use of the environment.

The Government of Malawi has stated that the creation of a supporting environment for the participation of the private sector requires that the goals of the government during this period need to be the promotion and development of a supporting environment that will enhance the inclusive growth and competitiveness of the private sector (Government of Malawi, 2011). The government expected the following outcomes during the five-year period: the creation of an improved environment for domestic and foreign investments; an increase in the investment level by the domestic and foreign entrepreneurs, and improved productivity and market access of enterprises (Government of Malawi, 2011).

The strategies that had to be implemented to achieve the private sector participation are as follows: foster the pro-business legal and regulatory reforms; provide supportive infrastructure and services for both start-ups and expanding enterprises; promote the growth of local SMMEs; promote investment in rural areas by the private sector; strengthen the capacity of the private sector supporting institutions and PPPs; enhance distribution of business information; promote the adoption of modern and

appropriate technologies; establish a national investment company, and promote and strength the development of cooperatives (Government of Malawi, 2011)

4.2.5 The Malawi Growth and Development Strategy of 2017-2022

The Malawi Growth and Development Strategy of 2017-2022 (MGDS III) is a medium term strategy for the term from 2017 to 2022, and its aims are to make Malawi a productive and competitive country through sustainable agriculture and economic growth, energy, industrial and infrastructure development (Government of Malawi, 2017). Since some of the objectives could not be achieved during the MGDS II, because of insufficient donors to support the programmes, the MGDS III will depend more on domestic resources to achieve its objectives (Government of Malawi, 2017).

During the MGDS III, the government expects the trends, as presented in Table 4.1, related to some of the macroeconomic variables from 2018 to 2022.

Table 4.1: Projected macroeconomic trends in growth in Malawi (2018 -2022) in percentage

	2018		2019		2020	2021	2022
	Projected	Achieved	Projected	Achieved			
Private Investment	6.0	6.4	6.0	6.7	6.0	6.0	6.0
Public Investment	12.0	4.4	12.0	5.6	12.0	12.0	12.0
GDP	6.9	4.4	6.4	4.4	6.1	6.2	6.1
Inflation	5.6	12.4	7.1	9.4	7.7	7.5	7.7

Source: Malawi Growth and Development Strategy (2017); World Bank (2021)

Public investment was expected to be higher than private sector investment during the implementation of the MGDS III (Government of Malawi, 2017). In 2018 and 2019, the government achieved its target for private investment, which was 6.4% and 6.7%, respectively (see Table 4.1). However, private investment was higher than public investment, which the government had projected at 12%, and it was 4.4% in 2018 and 5.6% in 2019 (World Bank, 2021).

In order to achieve sustainable economic growth, some of the key policies that have been identified by the government to ensure the successful implementation of the MGDS III include:

- To increase public investment by $1.2 billion, and it is expected that this investment will grow the economy by creating jobs and reducing inequality;
- As there was an increase of private sector investors in sectors such as energy, water and communication, the government plans to finance projects in these sectors through the Public Private Partnership; and
- The government will get financing through concessional borrowing to complement domestic resource mobilisation efforts and this will make sure that the government debt is maintained at sustainable levels and that the private sector is not crowded out (Government of Malawi, 2017).

4.3 INCENTIVES FOR PRIVATE INVESTMENT IN MALAWI

The Malawi government, just as in South Africa and Botswana, has introduced incentives that ensure that it promotes and encourages investment from both local and foreign investors.

Tax incentives

According to the Malawi Investment and Trade Centre (MITC), the government of Malawi offers various tax incentives to encourage investment in the country. Some of the incentives that are offered are a 100% investment allowance on new and unused industrial buildings, plant and machinery, while for used buildings it is 40%. The government also offers 25% transport tax allowance on international transport costs, and exemption of duty on direct importation of goods used in the tourism industry.

Export Processing Zones

According to the MITC, the Export Processing Zones (EPZs) started in 1995, with the objective to attract industries that are export-orientated, by offering them favourable investment incentives ((MITC, n.d.).

The incentives under the EPZ scheme include the exemption of: corporate tax, withholding tax on dividends, duty on capital equipment and raw materials, excise tax on the purchases of raw materials and packaging materials made in Malawi and value added tax (MITC, n.d.).

4.4 PRIVATE INVESTMENT TRENDS IN MALAWI

From 1980 to 2018, the average total investment as a percentage of GDP was 14.9%, while private investment averaged 7.1%. For the period until 2001, public investment surpassed the level of private investment, except for 1988 to 1991 (see Figure 4.1). As a percentage of GDP, the level of private investment has been fluctuating since 1980, reaching a record high of 17.3% in 2009. In 1980, it was lower than public investment, while in the 2000s, it surpassed the level of investment by the government.

Figure 4.1 provides a graphical illustration of the public, private and total investment as a percentage of GDP from 1980 to 2018 in Malawi.

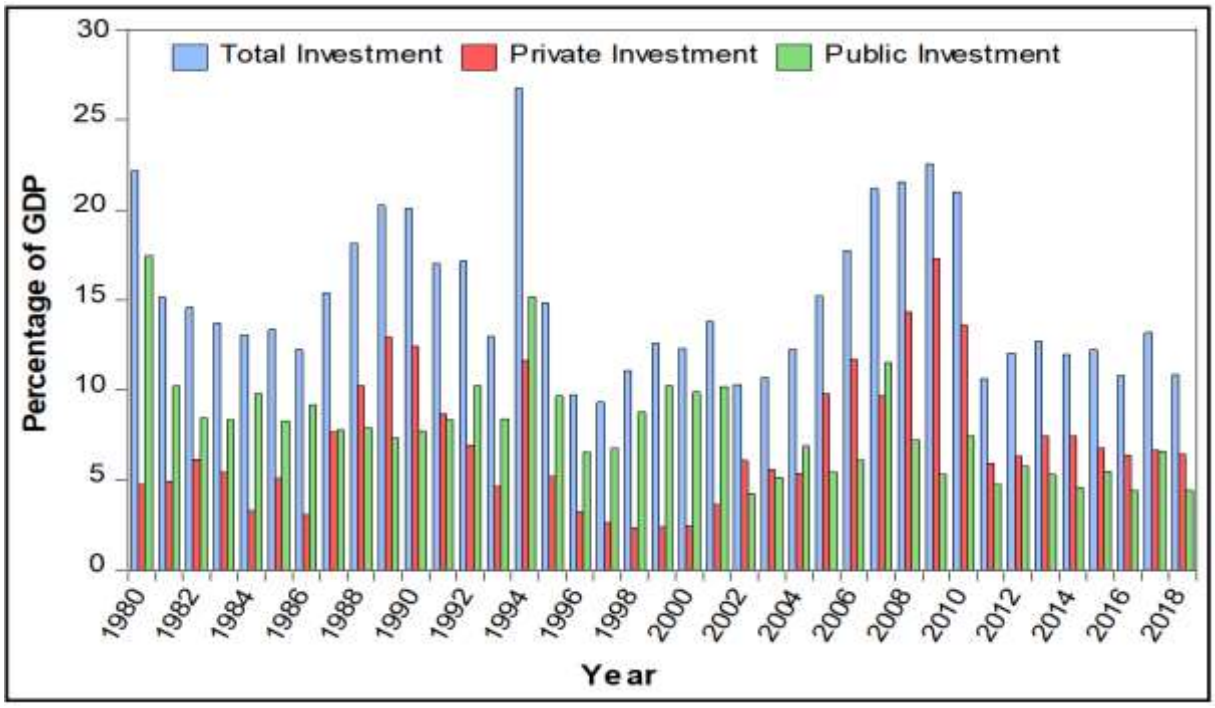


Figure 4.1: Public, private investment and total investment as a percentage of GDP in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

Unlike South Africa and Botswana, where investment by the private sector as a percentage of GDP has been higher than that of the public sector from 1980 to 2018, in Malawi, private investment was lower than public investment for most of the years from 1980 to 2002. This suggests that public investment crowded in private investment in South Africa and Botswana, while in Malawi, public investment crowded out private investment during this period. Malawi has the lowest rate of private investment as a percentage of GDP, when compared with South Africa and Botswana.

Figure 4.2 provides a graphical illustration of the trends in private investment as a percentage of GDP from 1980 to 2018.

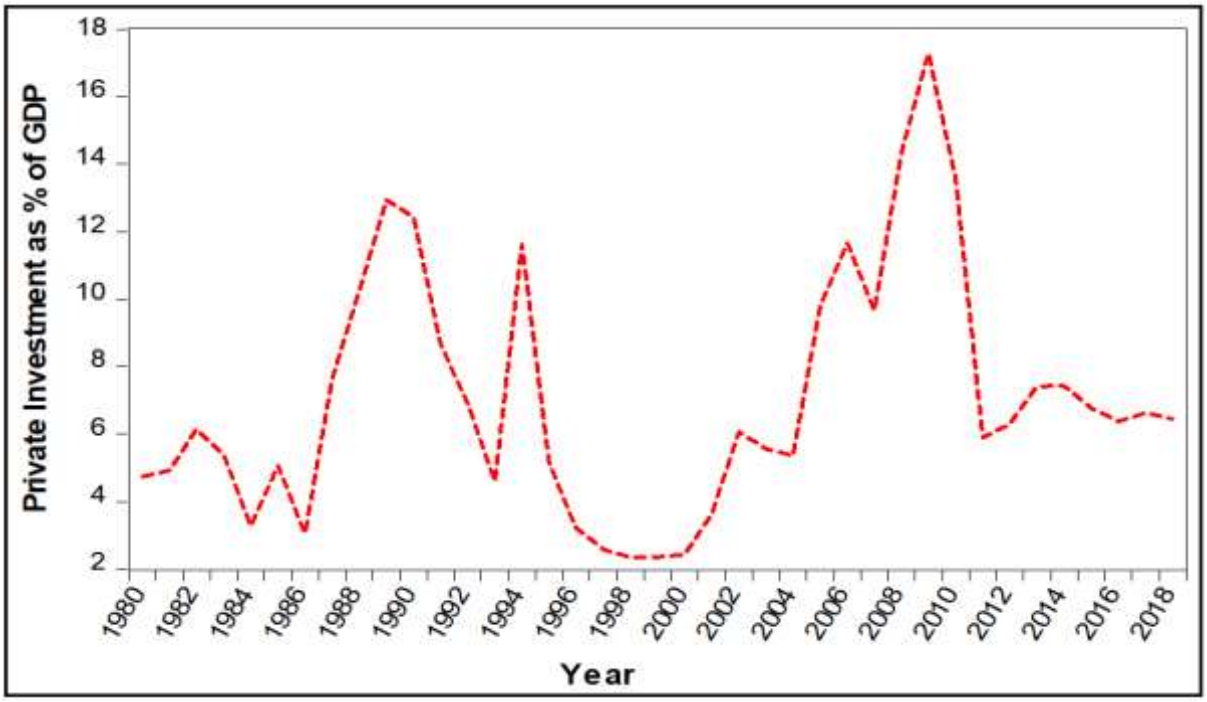


Figure 4.2: Private investment as a percentage of GDP in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

Private investment as a percentage of GDP declined from 34.5% in 1980 to 23.1% in 2018 in Botswana. In South Africa, it declined to 15.2% in 2018, down from 19.9% in 1980, while in Malawi, there was an increase from 4.7% in 1980 to 6.4% in 2018 (World Bank, 2021). In Malawi, private investment as a percentage of GDP has been fluctuating since 1980. In 1980, private investment was 4.7%, before increasing by a margin to 6.1% in 1984. During the first phase of privatisation from 1984 to 1994, private investment increased to 11.6% from 3.3%. However, the public sector was still the main contributor to total investment. The reason could be that the government continued to crowd out the private sector in the share of domestic bank credit. The government and parastatals' share of the domestic bank credit increased from 45% in 1980, to 73% in 1992, and this limited the growth of the private sector (Makuyana & Odhiambo, 2014).

In 1996, when the second phase of privatisation began, private investment was 3.2% before declining to 2.6% the following year. It continued to decline, averaging 2% until 2002, when it increased to 6.1%. In 2003, private investment as a percentage of GDP decreased to 5.6% from 6.1% in 2002 and continued its downward trend to 5.4% in

2004. For the year 2006, private investment was 11.7%, which was higher, compared to the 9.8% in 2005. In 2007, private investment declined to 9.7% from the 11.7% in 2007, before it increased to 14.3% in 2008. It further increased to 17.3% in 2009, then declined to 5.9% in 2011 (see Figure 4.2). In 2012, it increased to 6.3% from 5.9% in 2011, until it reached 6.4% in 2018.

4.5 MACROECONOMIC DRIVERS OF PRIVATE INVESTMENT IN MALAWI

Domestic private investment in Malawi has mainly been determined by the various key macroeconomic determining factors, similar to those in South Africa and Botswana, and that are discussed in this section. These determinants include public investment, economic growth, interest rate, credit to the private sector, inflation and trade openness.

4.5.1 Economic growth

Economic growth has an important influence on the level of private investment, because when the economy grows, it can create job opportunities, and people can earn an income that they can use to buy goods and services. Therefore, when there is an increase in the demand for goods and services, it creates an investment opportunity for investors to produce goods and services. Malawi experienced the highest economic growth in the 1990s, when it achieved a growth rate of 16.7% in 1995. However, it has also experienced negative growth in some years, for example, in 1981, it was -5.3%, -0.2% in 1986, -7.3% in 1992, -10.2% in 1994, and -5% in 2001.

Figure 4.3 presents a graphical illustration of the economic growth rates and private investment as a percentage of GDP from 1980 to 2018.

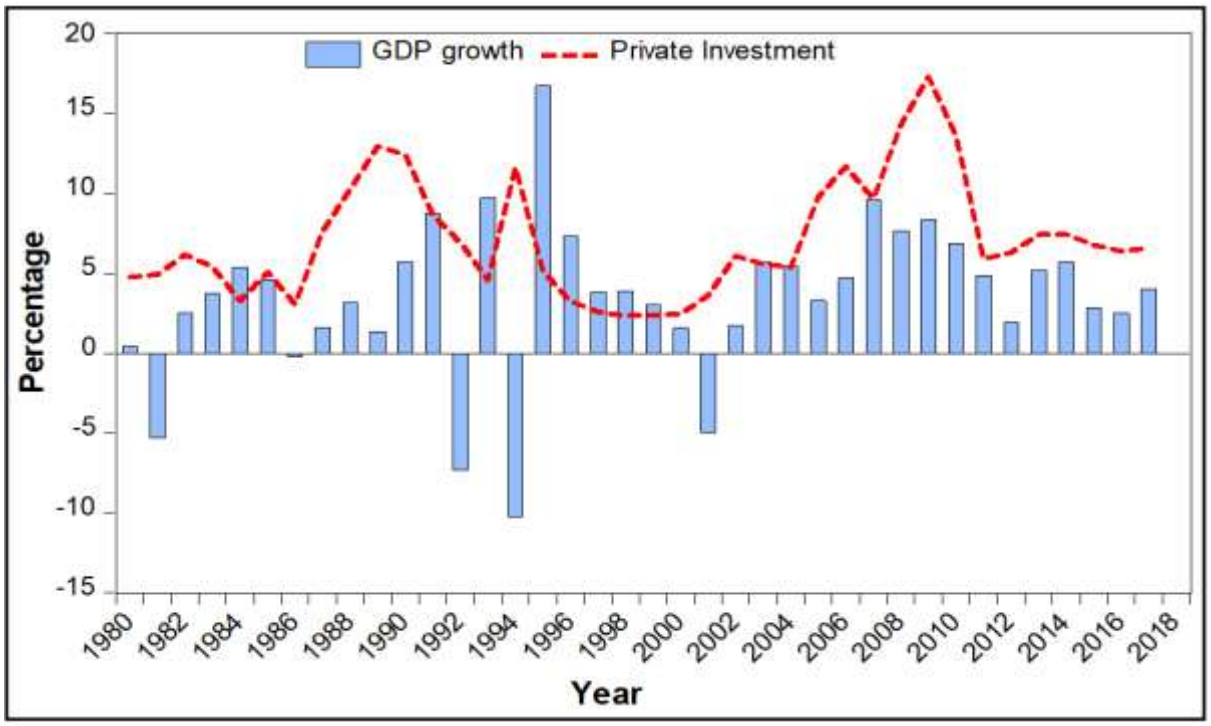


Figure 4.3: Economic growth and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

In 1980, GDP growth was 0.4%, before it decreased to a negative growth rate of -5.3% in 1981. In 1982, the economy grew to 2.5%, before it increased slightly to 3.7% in 1983, and further to 5.4% in 1984. In 1985, the GDP growth rate was at 4.6% before decreasing for the second time in the 1980s, to a negative growth of -0.21% in 1986. In 1991, the economic growth was 8.7%, before decreasing to -7.3% in 1992.

In 1994, the economic growth increased to 9.7%, before reaching a record low of - 10.2% in 1994. In 1995, the GDP growth rate reached a record high of 16.7%, before decreasing to 7.3% in 1996, and continuing to decline until it reached -5% in 2001. During the period from 2002 to 2005, prior to the implementation of the MGDS, the average of the GDP growth was 3.5%, compared to the set target of 5.2% (Government of Malawi, 2011).

During the MGDS, from 2006 to 2011, the economy also performed well at an average real GDP growth rate of 7.5% against the target of 6% (Government of Malawi, 2011). There was a sharp decline in GDP growth rate to 1.9% in 2012 from 4.9% in 2011, before growing to 5.2% in 2013. It increased to 5.7% in 2014, then declined to 2.5% in 2016, and increased to 4.4% in 2018.

4.5.2 Public investment

The literature regards public investment as a contributing factor to private investment. However, public investment can either complement or crowds out private investment. The trend shows evidence of a positive relationship between public and private investment in Malawi for the period 1980 to 2018, where public investment as a percentage of GDP averaged 7.9%, while private investment as a percentage of GDP averaged 7.1%.

Figure 4.4 provides a graphical illustration of private and public investment as a percentage of GDP for 1980 to 2018 in Malawi.

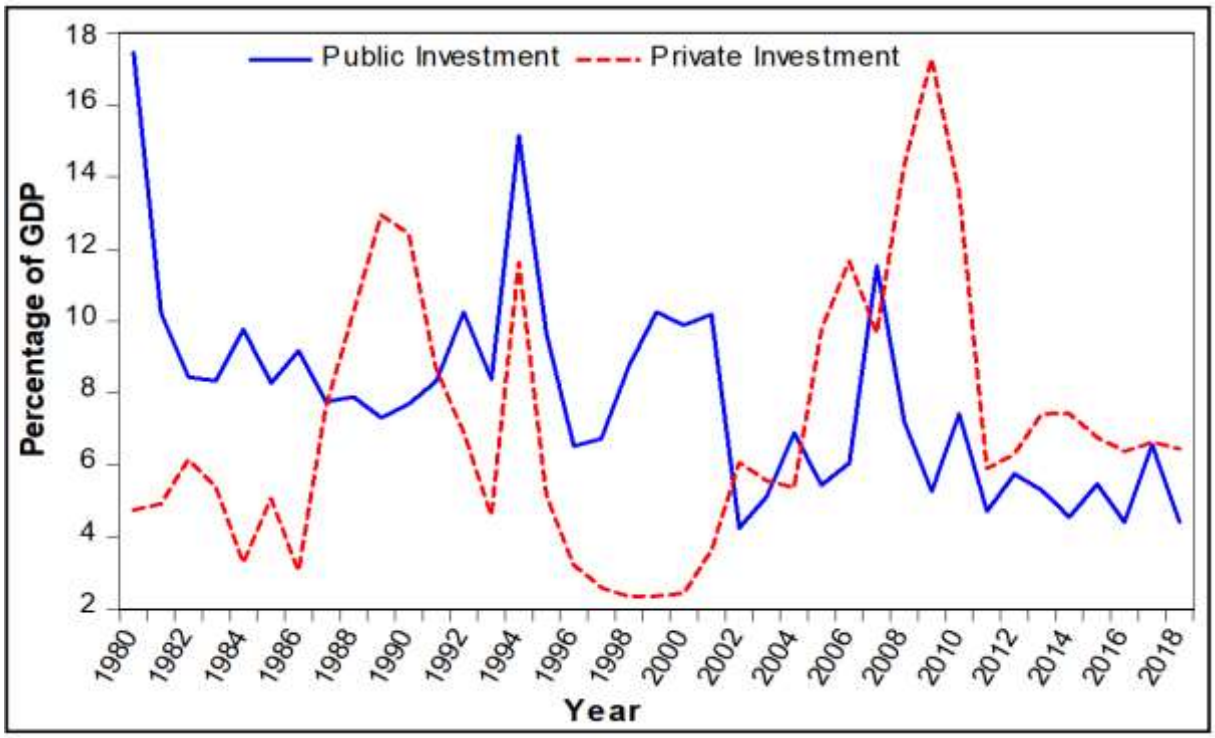


Figure 4.4: Public investment and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

In 1980, public investment was 17.5%, before declining significantly to 10.2% the following year. In 1984, when the first phase of privatisation started, the public investment went up to 9.8%, from the 8.3% in 1983. It declined to 8.3% in 1985, before it increased again to 9.2% in 1986. For the period 1987 to 1990, public investment decreased, and averaged 7.7%. In 1991, public investment increased to 8.3% from 7.7% in 1990, before increasing further to 10.2% in 1992. It then decreased to 8.4% in 1993, before it significantly increasing to 15.1% in 1994 (see Figure 4.4).

When the second phase of privatisation started in 1996, public investment as a percentage of GDP was 6.5%. It then increased to 10.3% in 1999, and remained at 10.2% in 2001, before a decline to 4.2% in 2002. After 2002, private investment started to exceed the public investment. This could be due to the government implementing the Malawi economic growth strategy 2004, which addressed the limitations faced by the private sector.

According to the IMF (2018), the level of investment by the public sector in Malawi was an average of around 5.5% of GDP for the past 25 years, which is generally low when compared to that of sub-Saharan Africa (SSA) and other low-income countries, which have an average of about 7% - 8% of GDP. The IMF (2018) further stated that the government of Malawi spends about 54% of its total public investment on economic infrastructure, which includes energy, transport sector, agriculture, communication and manufacturing.

4.5.3 Domestic credit to the private sector

Domestic credit to the private sector is a determinant of private investment. The investors that do not have access to funds and savings have to apply for funds to finance the investment. The trend shows that there is a positive relationship between credit to the private sector and private investment.

Figure 4.5 provides a graphical illustration of the trends in private investment and domestic credit to the private sector as a percentage of GDP.

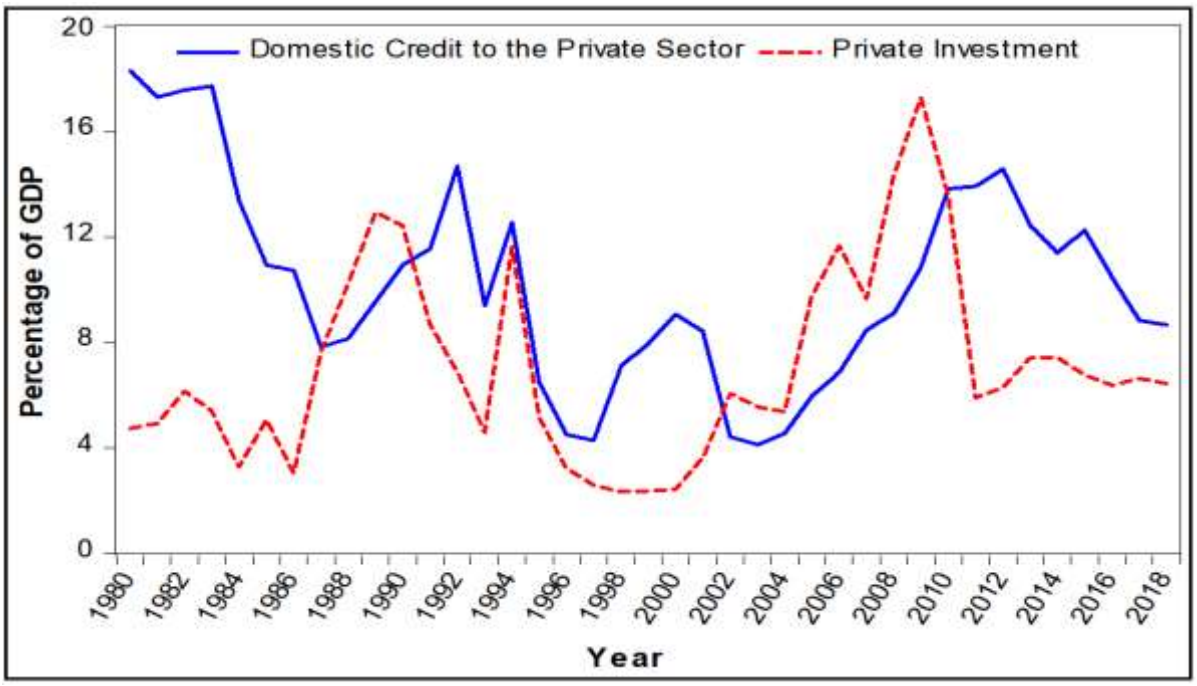


Figure 4.5: Domestic credit to the private sector and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

The domestic credit to the private sector has been on a decreasing trend from 1980 when it started to decrease from 18.3% to 7.8% in 1987. In 1988, it was 8.2% before it increased to 14.7% in 1992 after this, it decreased to 6.5% in 1995. It further decreased to 4.5% in 1996 before it increased to 9.1% in 2000.

In 2006, domestic credit to the private sector increased to 6.9% and in 2008, it increased to 9.1% from 8.5% in 2007. According to Malawi Ministry of Finance, Economic Planning and Development (2019), there was significant growth of 11.5% in 2018 to credit to the private sector, compared to 0.4% growth in 2017, and in real terms, when compared to the contraction of 6.7% in 2017, the growth of the credit to the private sector in 2018 grew by 1.6% in 2018.

4.5.4 Real interest rate

As in the case of South Africa and Botswana, the real interest rate fluctuated for the period 1980 to 2018. The last time the countries had a negative interest rate for the period from 1980 to 2018, was in 1987 for South Africa, while for Malawi, it was 2002, and for Botswana it was 2016 (World Bank, 2021).

Figure 4.6 provides a graphical illustration of the real interest rate and private investment as a percentage of GDP trends from 1980 to 2018.

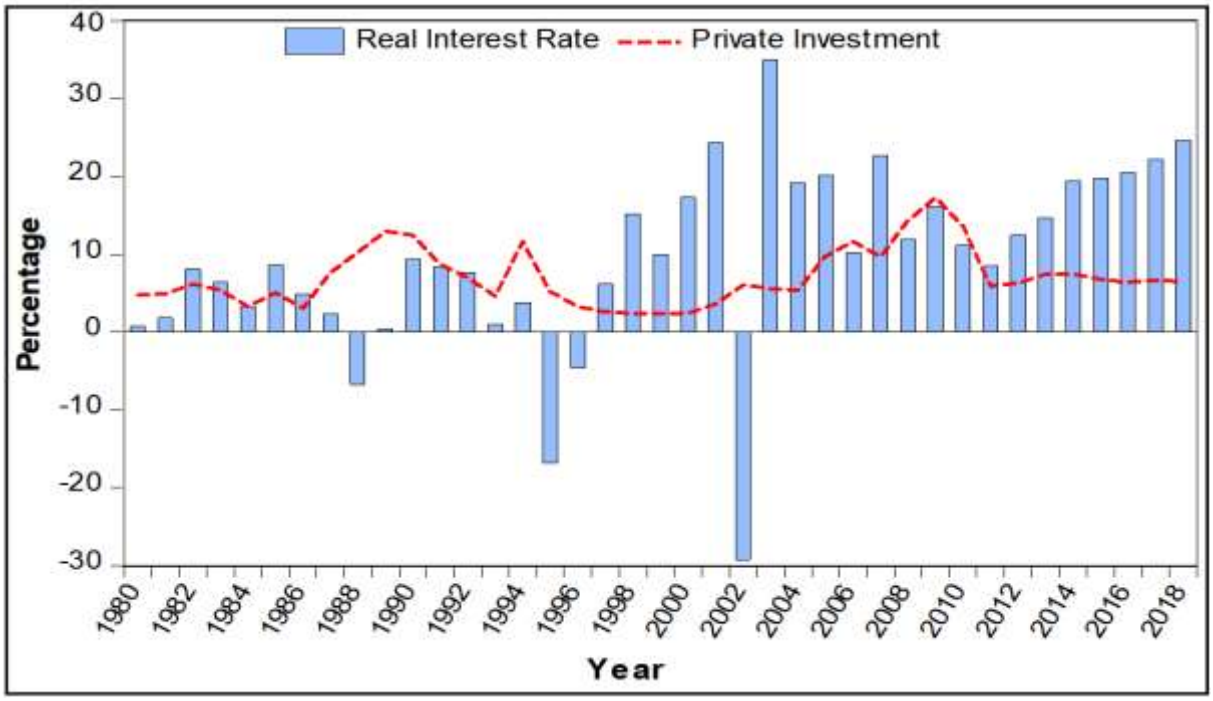


Figure 4.6: Real interest rate and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

The real interest rate has also been fluctuating; it averaged 9.5% during the period 1980 to 2018, and the lowest interest rate during the review period was in 2002 when it was -29.2%, and the highest interest rate was in 2003, when it was 35%. In 1980, the interest rate was at a low level of 0.8%, before increasing to 1.8% in 1981. In 1982, there was a sharp increase to 8.1%, then it decreased to 3.3% in 1984, before increasing again to 8.7% in 1985. It started to decrease and reached -6.7% in 1988, which was the lowest rate in the 1980s.

The lowest interest rate in the 1990s occurred in 1995, when it was -16.9%. There are periods where the real interest rate was negative, for example, it was -6.7% in 1988, -16.9% in 1995, -4.6% in 1996, and -29.2% in 2002. During the implementation period of the MGDS I, from 2006 to 2011, the economy of Malawi's real interest rate also decreased from 10.2% to 8.5%. The level of private investment increased to 17.3% in 2009, from 11.7% in 2006, however, it started to fluctuate until it reached 6.4% in 2018. The interest rate increased from 0.8% in 1980 to 24.6% in 2018.

4.5.5 Inflation rate

Inflation is another determinant of private investment and it represents uncertainty in the economy. Therefore, when inflation is high, we can expect private investment to

be low, so there is an inverse relationship between the two variables. Figure 4.7 provides a graphical illustration of the trends of inflation rate and private investment as a percentage of GDP.

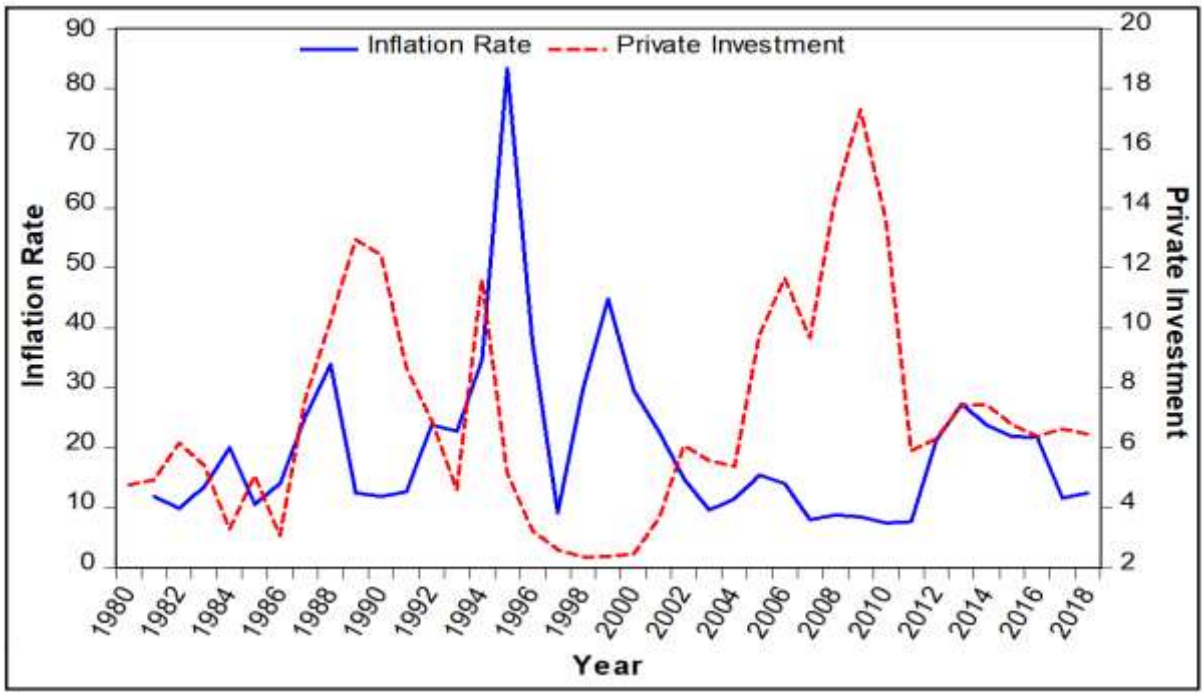


Figure 4.7: Inflation rate and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

Figure 4.7 shows that there is an inverse relationship between inflation and private investment in Malawi. In the 1980s, inflation rate reached 33.9% in 1988 from 11.8% in 1981. In the 1990s, inflation continued to increase; it increased to 34.6% in 1994 from 11.8% in 1990, before reaching 83.3% in 1995, and this was a result of the floatation of the Malawi Kwacha in February 1994 (Simwaka, 2004). For the period 1992 to 2001, inflation was above 20%, except in 1997, when it was 9.1%. In 1996, the inflation rate started to decline to 37.6%, and then to 9.1% in 1997, which was the lowest rate in the 1990s, before increasing again to 44.8% in 1999. The increase was due to the depreciation of the Malawi currency, the Kwacha, in 1998, which resulted in high prices of both imported materials and finished products, especially petroleum products and maize (Simwaka, 2004).

The government focused on its medium-term strategies to manage inflation to reduce it to a single digit. In the 2000s, from 2000 to 2018, inflation averaged 15.7%, which was a decline from an average of 24.3% for the period 1980 to 1999. During the implementation of MGDS I, the government managed to achieve a single digit inflation

rate for the period 2007 to 2011. In 2012, inflation increased to 22.3%, from the 7.6% in 2011, before it declined again to 12.4% in 2018. Malawi has the highest inflation rate, if compared with South Africa and Botswana.

4.5.6 Trade openness

The openness of an economy attracts both domestic and foreign investors. If an economy is open, domestic investors are able to invest in the production of goods and services that are exported to other countries. When compared with South Africa and Botswana, the share of trade measured by the ratio of imports plus an export to GDP in Malawi is higher than in South Africa. It averaged 101.4% in Botswana, 60.1% in Malawi and 52.8% in South Africa for the period 1980 to 2018 (World Bank, 2021).

Figure 4.8 provides a graphical illustration of the trade openness and private investment as a percentage of GDP trends from 1980 to 2018.

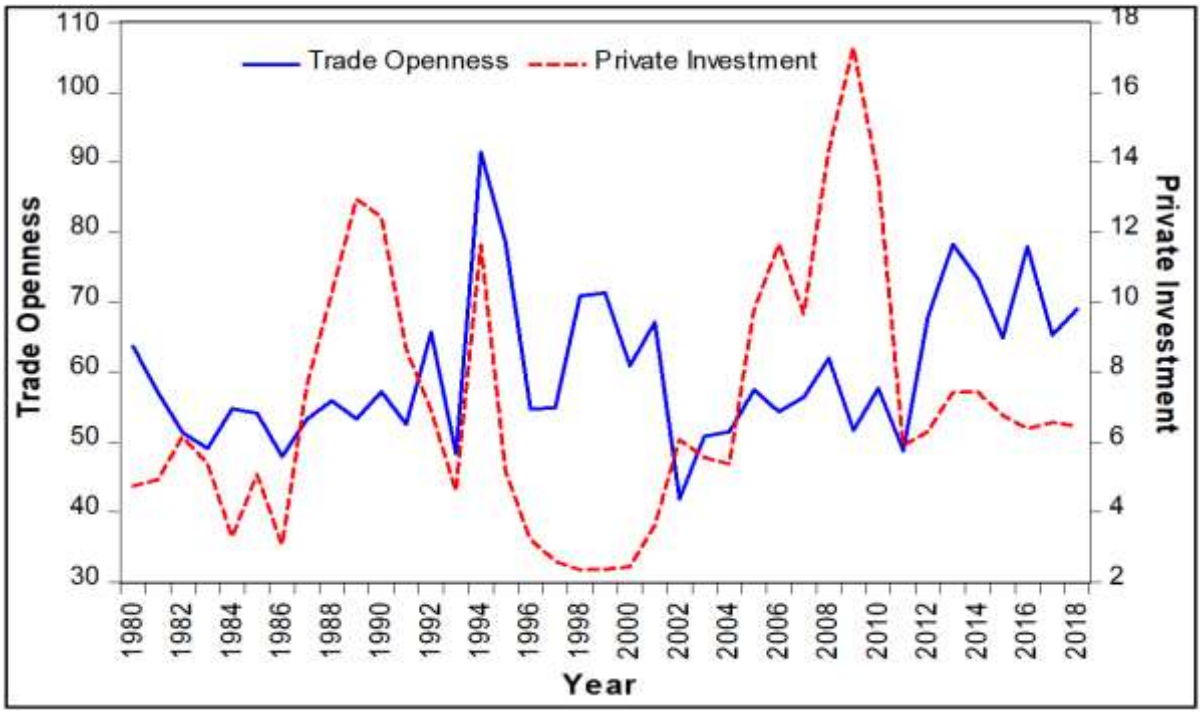


Figure 4.8: Trade openness and private investment in Malawi (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

The trends in Figure 4.8 show that there is a positive relationship between trade openness and private investment. In 1980, trade openness was 63.6%, before it started to decrease to 57.2% in 1982, then to 51.3% in 1982, before it reached 49.1% in 1983. In the 1980s, it continued to decrease until it started to increase in the early

1990s, where it reached 91.4% in 1994. However, it started to slow down, and decreased to 41.9% in 2002.

After 2002, there was a continuous increase until 2008, when trade openness increased from 56.4% in 2007, to 62% in 2008. For the period 2008 to 2018, growth in trade openness has been fluctuating, reaching the highest point of 78.3% in 2013 and the lowest of 48.8% in 2011. For the period 1980 to 2018, trade openness averaged 60.1%, while private investment averaged 7.1%.

4.6 COMPARISON OF THE MACROECONOMIC VARIABLES IN SOUTH AFRICA, BOTSWANA AND MALAWI

When comparing the three Southern African countries, Botswana had the highest average domestic private and public investment for the period 1980 to 2018. In Malawi, public investment surpassed private investment, while in South Africa and Botswana, private investment was higher than public investment. Table 4.2 presents the average macroeconomic trends in South Africa, Botswana and Malawi from 1980 to 2018.

Table 4.2: Average macroeconomic trends in South Africa, Botswana and Malawi from 1980 - 2018

	South Africa	Botswana	Malawi
Private Investment as % of GDP	15.8	18.9	7.1
Public Investment as % of GDP	4.2	10.3	7.9
Economic Growth	2.3	6.4	3.4
Domestic Credit to the Private Sector as % of GDP	108.9	18.3	10.2
Real Interest Rate	4.2	3.6	9.5
Inflation Rate	8.9	8.9	20.0
Trade Openness as % of GDP	52.8	101.4	60.1

Source: Own computation from World Bank (2021)

The average of public investment, as a percentage of GDP was 4.2% for South Africa, while Malawi averaged 7.9% and Botswana 10.3% for the period 1980 to 2018. Botswana had the highest average rate of economic growth at 6.4%, and South Africa hads the lowest average for the period 1980 to 2018, at 2.3%, while Malawi had an average of 3.4%. The average inflation and real interest rates for Malawi were high when compared to those for Botswana and South Africa.

Regarding the level of the credit to the private sector, South Africa has the highest average at 108.9%, while Malawi has the lowest average at 10.2%. Botswana is a relatively open economy, and the average ratio of imports plus exports to GDP for the period 1980 to 2018 was 101.4%, followed by Malawi at 60.1%, and South Africa at 52.8%.

Figures 4.9 and 4.10 present graphical illustrations of private investment and public investment as a percentage of GDP for the three countries.

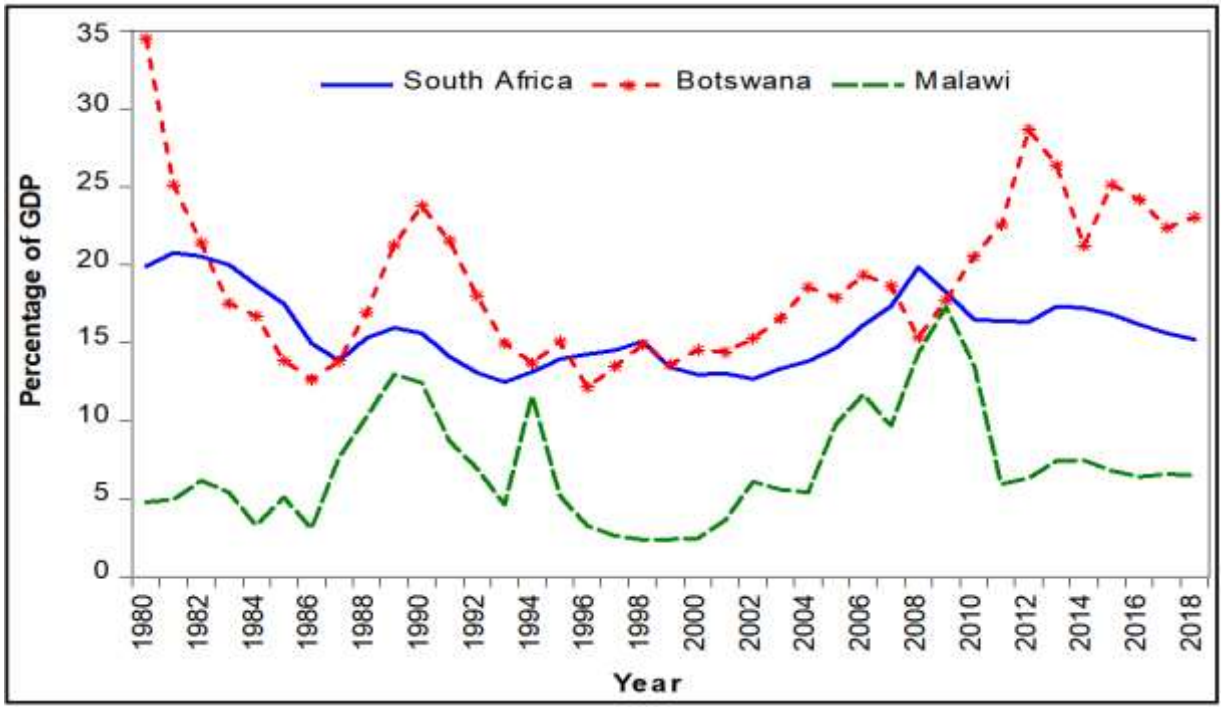


Figure 4.9: Private investment in Botswana, Malawi and South Africa (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

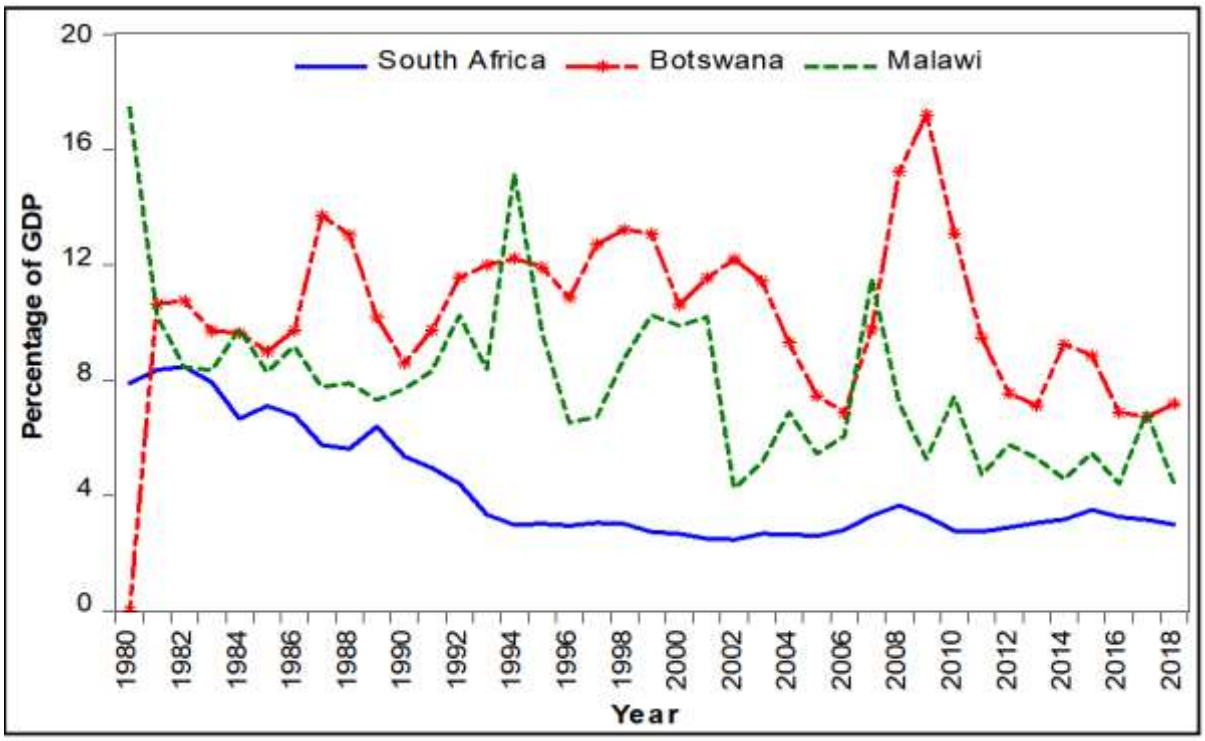


Figure 4.10: Public investment in Botswana, Malawi and South Africa (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

Private investment as a percentage of GDP declined from 34.5% in 1980 to 23.1% in 2018 in Botswana, while in South Africa, it declined to 15.2% in 2018, from 19.9% in 1980. In Malawi, there was an increase from 4.7% in 1980 to 6.4% in 2018. Regarding public investment, Botswana also has the highest percentage, when compared with Malawi and South Africa. South Africa has the lowest investment by the government, and this has been on a decreasing trend from 1980. Of the three countries, these trends place Botswana at the helm, with higher levels of public investment than South Africa and Malawi. South Africa has the lowest investment by the government, and this has been on a decreasing trend from 1980. The average of public investment as a percentage of GDP was 4.2% for South Africa, while Malawi averaged 7.9%, and Botswana 10.2% for the period 1980 to 2018 (World Bank, 2021).

Figure 4.11 provides a graphical illustration of the economic growth in Botswana, Malawi and South Africa for the period 1980 to 2017.

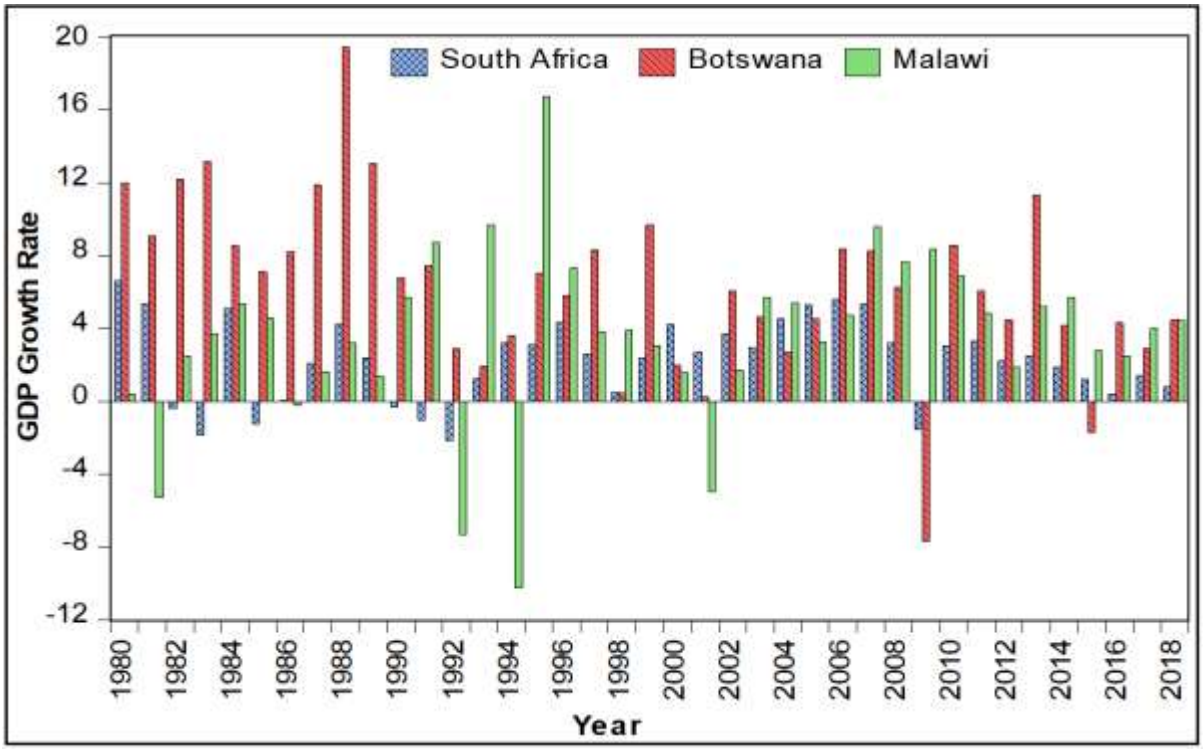


Figure 4.11: GDP growth rate in Botswana, Malawi and South Africa (1980 – 2018)

Source: Own compilation from World Bank Development Indicators (2021)

In South Africa, Botswana and Malawi, the economic growth rate has been fluctuating, with the highest growth rate recorded at 6.6% in 1980, and the lowest was in 1992 at the growth rate of -2.1% in South Africa. In Botswana, the highest growth rate recorded was at 19.5% in 1988, and the lowest was in 2009 when the country was in a recession, with a growth rate of -7.7%. In the 1990s, economic growth reached 16.7% in Malawi, however, it has also experienced negative growth in some years, such as 7.3% in 1992 and -10.2% in 1994.

4.7 CONCLUSION

This chapter examined the macroeconomic drivers of private investment in Malawi during the period 1980 to 2018. In Malawi, private investment as a percentage of GDP has been fluctuating since the 1980s, as in the case of South Africa and Botswana. Over the years, the Malawian government has been looking at ways to increase the economic growth through the diversification of the economy and the development of policies and strategies. The policies include the privatisation of SOEs, the MEGS, MGDS I, MGDS II and MGDS III. The Malawian government has also developed the policies of privatisation of SOEs as a way to involve the private sector in the economy,

similar to South Africa and Botswana. Unlike South Africa and Botswana, Malawi does not have a NDP but has the MGDS as a strategy to grow the economy.

The Malawian government has also introduced a range of investment incentives to encourage investment by both local and foreign investors that will boost economic growth and create employment, as in the case of Botswana and South Africa. The government continues to create a conducive environment for the private sector to invest to enable them to achieve sustainable economic growth.

The drivers that were discussed included public investment, economic growth, credit to the private sector, interest rates, inflation and trade openness. However, unlike in South Africa and Botswana, where private sector investment has always been higher than that of the public sector, in Malawi, for most of the years between 1980 and 2018, public investment surpassed investment by the private sector.

CHAPTER 5

THEORETICAL AND EMPIRICAL LITERATURE REVIEW

5.1 INTRODUCTION

This chapter reviews the literature that is divided into theoretical and empirical components, as related to the determinants of private investment. The chapter is divided into four sections. Section 5.2 reviews the theoretical literature related to the determinants of private investment, the crowding effects of public investment on private investment, as well as on the causal relationship between private investment and its determinants. Section 5.3 assesses the empirical studies related to the determinants of private investment, the crowding effects of public investment on private investment, and the causality between private investment and its determinants. Lastly, Section 5.4 presents concluding remarks.

5.2 THEORETICAL LITERATURE REVIEW

Investment is defined by Keynes (1936), as the growth of capital equipment, which can be made up of fixed capital, working capital or liquid capital. This section is divided into three sections. Section 5.2.1 discusses the theories related to the determinants of private investment, while Section 5.2.2 presents the theory related to crowding in or out of public investment on private investment. Lastly, Section 5.2.3 discusses the theory on the causality between private investment and its determinants.

5.2.1 The determinants of private investment

There are several theories that explain the factors that determine investment. The theories that are discussed in this section include the Accelerator theory of investment, the Neoclassical theory, and the Q-theory of investment.

5.2.1.1 Accelerator Theory of Investment

The Accelerator Theory of Investment was first introduced by Clark (1917), and it is associated with the Keynesian approach because of its assumption of fixed prices. The theory makes investment a linear proportion of changes in output and

expectations. Profitability and the cost of capital do not play a role in the accelerator model (Serven & Solimano, 1992).

Eklund (2013) stated that if it is assumed that the price of output is constant, and the price of variables *s* and *r* are fixed, as in Jorgenson's (1963) user cost of capital, the optimal capital stock can be expressed follows:

$K^* = \alpha Y$ ……5.1

Equation 5.1 is the accelerator principle, where the desired capital stock is related proportionally to output (Eklund, 2013). Thus, investment in any given period will depend on the growth of output, which is expressed as follows:

$I = \alpha Y$ ……5.2

According to Omojolaibi, Okenesi and Mesagan (2016), the accelerator model assumes that the demand for capital stock is obtained from the demand of goods. This means that if the demand increases for the goods that capital equipment produces, and the current machines are unable to meet the expected demand, then new machinery will have to be bought to increase the production of the goods. Therefore, the changes in level of output have direct effects on investment level (Omojolaibi *et al.,* 2016).

If the prices are flexible and toward the desired capital stock there is partial adjustment, then each period of investment will depend on the output prices, input and interest rate (Eklund, 2013). The accelerator theory also assumes a complete and immediate adjustment of stock (Eklund, 2013).

5.2.1.2 Neoclassical Theory of Investment

According to this theory, output and the price of the capital determine the desired capital stock. The price of capital, in turn, depends on the price of capital goods, the real interest rate and the depreciation rate (Serven & Solimano, 1992). The investment equation, which is the equation for the change in the capital stock, results from the time lag in decision-making and delivery, which in turn, causes a difference between the current and desired capital stock (Serven & Solimano, 1992). Therefore, the investment equation results from the gap between desired capital and the actual capital stock.

According to Shafik (1992:264), the relationship between investment and the capital stock is defined as

$$I_t = \delta K_{t-1} + \alpha(L)\Delta K_t^* \quad \text{.....5.3}$$

Where I - investment, K - capital stock, δ - depreciation rate and $\alpha(L))$ - function in the lag operator.

Serven and Solimano (1992:97) stated that the neoclassical theory is criticised because it assumes that there is perfect competition, and also the assumption of static expectations about future prices, output, and interest rates is inappropriate, as investment is, in actual fact, a forward-looking process.

5.2.1.3 Q-Theory of Investment

Tobin (1969) suggested that what matters in investment is the relationship between the increase in the value of the firm due to the installation of an additional unit of capital and its replacement cost (Serven & Solimano, 1992). This suggests that firms will invest more if the in the market value of an additional unit exceeds the replacement cost. Hence, marginal Q is defined as the increase of the current value of a firm's profit, conforming to an additional growth in a capital stock (Sallam, 2019). However, the marginal Q, because of delivery lags and adjustment or installation costs, differ from unity, and is not easily measured, therefore, the average Q, which is the ratio of the value of the entire existing capital stock to its replacement cost is used (Serven & Solimano, 1992). According to Sallam (2019), the marginal and average Q are expressed as follows:

Marginal Q

$$\mathrm{Q_t^M} = \frac{\frac{\partial \mathrm{V}}{\partial \mathrm{k}}}{\mathrm{P_t^I}} \quad \text{.....5.4}$$

Average Q

$$\mathrm{Q_t^A} = \frac{\mathrm{V_t}}{\mathrm{p_t^I k_t}} \quad \text{.....5.5}$$

Where $\mathrm{V_t}$ - firm value, $\mathrm{p_t^I}$ - price of capital good, and $\mathrm{k_t}$ - capital good.

However, there are problems related to the average Q, for example, if the business enjoy economies of scale or market power, or if they are unable to sell all they want, there will be a difference between the marginal and the average Q (Serven &

Solimano, 1992). Also, the assumption that firms will increase installation costs is not certain because investment projects are unstable (Serven & Solimano, 1992).

5.2.2 Crowding In and Crowding Out Theory

Crowding in states that government spending increases private investment, while crowding out means that government spending reduces private investment in the economy. In literature, there are three views that exist on the crowding in or out of public investment on private investment. The Keynesians suggest that public investment crowds in private investment, while the Neoclassicals believe that it crowd out private investment, and the Ricardian Equivalence theorem advocates that government spending will leave private investment unchanged (Kuştepeli, 2005).

The Keynesians assume that there is under-employment in the economy, while the Neoclassicals assume there is full employment. The Keynesians suggest that under an expansionary fiscal policy in which there are tax cuts and increases in government spending, the output level of the economy and income will increase (Şen & Kaya, 2014). Keynes suggested that fiscal expansionary policy had the tendency to increase the private sector market through the fiscal multiplier (Omojolaibi, 2016). Therefore, this means that there is a crowding in of private investment in the economy (Şen & Kaya, 2014; Kuştepeli, 2005).

The Neoclassical theory believes that through fiscal expansionary policy, the government borrow funds to finance its expenditure, which causes interest rates to increase, as a result there will be less funds available for the private sector consumption and investment (Sineviciene & Vasiliauskaite, 2012). When government expenditure increases, interest rates have to increase to bring the capital market into equilibrium, which will lead to a reduction in private investment (Kuştepeli, 2005). Therefore, government spending will crowd out private investment.

The Ricardian equivalence theorem suggests that an increase in the budget deficits, as a result of an increase in government spending, will be expected to go together with an increase in taxes in the future (Kuştepeli, 2005). Therefore, as individuals think about their future income, they will not adjust their consumption or savings levels, and this will leave interest rates and private investment unchanged, which means that government spending will have no crowding in or out effect (Kuştepeli, 2005).

5.2.3 The Causality between Investment and its Determinants

The theoretical work on the causality between investment and its determinants comes from Samuelson (1939), who introduced the concept of the multiplier-accelerator. Samuelson (1939) merged the multiplier model and the acceleration principle into one theory. This was done by regarding the national income as made up of three components, which are governmental deficit spending, private consumption expenditure induced by previous public expenditure, and lastly, induced private investment (Samuelson, 1939).

According to Westerhoff (2006), the national income, Y_t equation may be written as:

$Y_t = C_t + I_t + G_t$

$C_t = \propto Y_{t-1}$

$I_t = b(C_t - C_{t-1}) = ab(Y_{t-1} - Y_{t-2})$

Where, C_t is consumption, I_t is induced private investment and G_t is government expenditure.

The induced private investment is equal to adjustments in consumption and national income (Westerhoff, 2006). The equation of investment suggests that the increase in consumption will cause firms to be optimistic, as they see the demand of their goods increasing and this encourages them to increase their level of investment (Todorova & Kutrolli, 2019).

Over the years, studies have found a strong relationship between investment and its determinants, such as economic growth, savings, and government spending. However, this does not indicate that there is a causal relationship. The multiplier-accelerator model indicates that there is a two-way causal relationship between aggregate investment and national income (Todorova & Kutrolli, 2019). This means that through the multiplier process, investment stimulates national income, whereas through the accelerator process, national income increases investment (Todorova & Kutrolli, 2019). However, a study by Blomström, Lipsey and Zejan (1996) found unidirectional causality running from economic growth to investment.

It is important to determine the direction of causality between private investment and its determinants, as it has important policy implications. However, the causal relationship between the variables is still uncertain. In literature, there are four views that exist on this causal relationship. These are: private investment causes the

determinants; the determinants causes private investment; private investment and the determinants causes each other, which implies the feedback between the two variables, and lastly, private investment and determinants are independent, implying that there is no causality between the variables (Erenburg & Wohar, 1995).

5.3 EMPIRICAL LITERATURE

This section reviews the studies that provide an understanding on the determinants of private investment. The section is divided into three sections as follows: Section 5.3.1 reviews the studies on the determinants of private investment, while Section 5.3.2 assesses the studies that have examined how public investment affect private investment, and Section 5.3.3 reviews the studies that have examined the causality between private investment and its determinants.

5.3.1 Empirical literature on the determinants of private investment

This section reviews empirical literature on the determinants of private investment. Section 5.3.1.1 assesses the macroeconomic determinants of private investment studies that have been conducted in African countries, while Section 5.3.1.2 examines the studies on the determinants of private investment in other countries.

5.3.1.1 The determinants of private investment in African countries

This section discusses studies that examined the determinants of private investment in African countries. These include the studies of Mitiku (1996), Ibrahim (2000), Shawa, Mwega and Kulundu (2012), Adugna (2013), and Ngoma, Bonga and Nyoni (2019), among others.

Mitiku (1996) investigated the macroeconomic determinants of private investment in Ethiopia from 1975 to 1994 using OLS. The results indicate that credit to the private sector, the real exchange rate, policy and external debt are the determinants of private investment. Real interest rate, growth of per capita GDP, public investment and change in terms of trade were found not to have an impact on private investment.

In another study based in Ethiopia, Ambachew (2010) examined the determinants of private investment for the period 1950 to 2003. The findings of the study indicate domestic market, trade openness, return to capital and liberalisation measures, infrastructural facilities and FDI have a positive impact, while government expenditure,

political instability and macroeconomic uncertainty have a negative influence on private investment.

Adugna (2013), using the OLS and data from 1981 to 2010 in Ethiopia, found that public investment, real GDP per capita, and external debt have a positive influence on private investment. In the short-run, inflation rate was found to have a negative impact. Other variables, such as lending interest rate and exchange rate, had an insignificant long-run effect that was negative, while it was positive for economic openness and corporate tax. Using the ARDL approach for the period 1992 to 2010, also in Ethiopia, Ambaye, Berhanu and Abera (2013) found that domestic saving, exchange rate and domestic credit have a negative significant influence, while government expenditure and external debt are found to have a significant positive effect on domestic private investment.

In Ghana, for the period 1970 to 1992, Asante (2000) found that the growth of real credit to the private sector has a positive and statistically significant influence on private investment. Private and public investments are found to complement each other. In another study based on Ghana, Ibrahim (2000) found that there is a significant relationship between private investment and the factors, such as mark-up, general price level, aggregate demand and the cost of investment in the long-run.

Also in Ghana, Frimpong and Marbuah (2010) used the ARDL approach to examine the determinants of private investment using data from 1970 to 2002. The study's findings reveal that the determinants of private investment are public investment, real interest rate, inflation, real exchange rate, openness and a regime of constitutional rule in the short-run, while in the long-run, the determinants are inflation, real output, openness, real interest rate, external debt and real exchange rate. Using the error correction mode (ECM), Naa-Idar, Ayentimi and Frimpong (2012) also studied the determinants of private investment with data from 1960 to 2010 in Ghana. The study found that the determinants are GDP, inflation, public investment, exchange rate, trade openness, private sector credit, foreign aid and external debt in both short- and long-run.

Using the ARDL methodology, Ouattara (2005) examined the determinants of private investment in Senegal, using data from 1970 to 2000, and found that public

investment, real GDP and foreign aid flows have a positive effect on private investment, while credit to private sector and terms of trade have a negative impact.

In South Africa, Kumo (2006) examined the effects of time varying uncertainty on aggregate private fixed investment in South Africa for the period 1975:Q1 to 2003:Q3 using the ECM technique. The findings of the study indicate that time varying macroeconomic uncertainty significantly reduces private fixed investment.

In Botswana, for the period 1976 to 2003, Lesotlho (2006) examined the determinants of private investment using the ECM technique, and found that in the long-run, GDP growth and real exchange rate have a positive effect. In the short-run, the study found that public investment has a negative influence, while real interest rate and bank credit to the private sector are both positive determinants. Inflation was found to be insignificant.

In Nigeria, using the ARDL approach, Ajide and Lawanson (2012) investigated the determinants of domestic private investment for the 1970 to 2010 period. The study found that real GDP, public investment, real interest rate, credit to the private sector, terms of trade, exchange rate and external debts are the determinants in the long-run, while in the short-run, real GDP, public investment and terms of trade are determinants of private investment.

In Tanzania, Michael and Aikaeli (2014) examined the determinants of private investment, using the ECM technique for the period 1975 to 2010. The study found that the variables that have an influence on the growth of private investment are GDP growth, public investment and credit to private sector, while there was no evidence to suggest that exchange rate, degree of openness of the economy and interest rate have an impact on the growth of private investment.

In Lesotho, using data from 1982 to 2013, and the ARDL methodology, Molapo and Damane (2015) investigated the determinants of private investment. The study found that economic growth and public investment have a positive impact on private investment, while an increase in the general price level has a negative impact on private investment in the long-run. Public investment has a positive effect, while general price level and economic growth have an insignificant impact in the short-run.

Using the ARDL methodology, for the Gambia, Ayeni (2020) examined the determinants of private investment, using data from 1980 to 2019. The study found

that government investment, credit to the private sector and interest rate have a positive influence, while real GDP and exchange rate have a negative impact, and inflation and external debt are insignificant in the long-run. In the short-run, external debt, credit to private sector and government investment are positive determinants, while interest rate, inflation and exchange rate are negative determinants, and real GDP is found to be insignificant. In Kenya, Rwanda and Burundi, Mose, Jepchumba and Ouru (2020) examined the macroeconomic determinants of domestic private investment for the period 2009 to 2018, and found that credit to the private and real GDP per capita have a positive and significant impact, while public investment has a negative and significant effect on private investment.

Fowowe (2011) examined the effect of financial sector reforms on private investment in selected sub-Saharan African countries from 1980 to 2006, and found that financial sector reforms have had a positive influence on private investment in the selected countries used in the study. In 18 sub-Saharan Africa countries, Misati and Nyamongo (2011) examined the relationship between financial sector development and private investment from 1991 to 2004. The results revealed that there is a negative relationship between interest rate on deposits and private investment, while the credit to the private sector has a positive impact, and turnover ratio on investment is found not to be significant. The study also found that the informal sector has a positive influence on private investment, and also that in Africa, institutional variables play an important role in determining the level of private investment.

In another sub-Saharan Africa study, Shawa *et al.* (2012) found that current account deficit, per capita income, inflation, per capita income growth, public investment rate, population growth, real interest rate, debt stock/GDP, total debt service/GDP, trade openness, terms of trade growth and the political environment jointly exert a significant impact on private investment. For the period 2000 to 2017, Ngoma *et al.* (2019) investigated the macroeconomic determinants of private investment for 35 sub-Saharan African (SSA) countries. The findings of the study revealed that public investment, GDP growth rate, inflation rate and interest rate are the determinants of private investment in the 35 SSA countries.

Table 5.1 summarises the empirical evidence on the determinants of private investment in African countries

Table 5.1: Summary of the empirical literature on the determinants of private investment in African countries

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Oshikoya (1994)	Four middle-income and four low-income African countries. 1970 to 1988	Ordinary least squares (OLS)	▪ Real GDP ▪ Public investment ▪ Credit to private sector ▪ Consumer price index ▪ Terms of trade ▪ Real exchange rate ▪ External debt service ▪ Lagged private investment	▪ Lagged debt service ratio, the domestic inflation rate, the public investment rate and the real exchange have the most impact on private investment rate in middle-income countries. ▪ Credit to the private sector, GDP growth rate and debt service ratio had the most impact on private investment in low-income countries
Mitiku (1996)	Ethiopia 1975 to 1994	OLS	▪ Public investment ▪ Real GDP per capita ▪ External debt ▪ Consumer price index ▪ Credit to private sector ▪ Real interest rate ▪ Real exchange rate ▪ Terms of trade	▪ The determinants are availability of finance, the real exchange rate, policy and external debt.
Asante (2000)	Ghana 1970 to 1992	Time-series analysis	▪ Public investment ▪ Credit to the private sector ▪ Real exchange rate ▪ Real interest rate	▪ Growth of real credit to the private sector has a positive effect on private investment. ▪ Private investment and public investment are complementary.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Inflation rate ▪ External debt ▪ Growth of real GDP ▪ Investment deflator ▪ Corporate tax ▪ Measure of trade regime	
Ibrahim (2000)	Ghana 1960 to 1990	Error correction approach (ECM)	▪ Mark-up ▪ General price level ▪ Inventory of finished goods ▪ Real GDP ▪ Real cost of investment	▪ In the long-run, mark-up, general price level, aggregate demand and cost of investment have a significant relationship with private investment.
Ouattara (2005)	Senegal 1970 to 2000	ARDL approach	▪ Real GDP ▪ Public investment ▪ Credit to the private sector ▪ Aid as % of GDP ▪ Terms of trade	▪ Real income, public investment and foreign aid flows have a positive impact on private investment. ▪ Terms of trade and credit to private sector have a negative impact on private investment.
Kumo (2006)	South Africa 1975:Q1 to 2003:Q3	ECM	▪ GDP growth ▪ Real interest rate ▪ Real domestic credit to the private sector ▪ Inflation rate ▪ Exchange rate	▪ Macroeconomic uncertainty has negative effects on private fixed investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Terms of trade	
Lesotlho (2006)	Botswana 1976 to 2003	ECM	▪ GDP growth ▪ Inflation rate ▪ Public investment ▪ Credit to the private sector ▪ Real interest rate ▪ Real exchange rate ▪ Trade liberalisation index	In the long-run: ▪ GDP growth and real exchange rate have a positive effect on private investment In the short-run: ▪ Public investment has a negative impact on private investment. ▪ Bank credit to the private sector and the real interest rate both are positive determinants of private investment.
Ambachew (2010)	Ethiopia 1950 to 2003	Multivariate single equation ECM estimation	▪ Foreign direct investment ▪ Private consumption ▪ Government spending ▪ Foreign reserve ▪ Inflation ▪ Trade openness ▪ Real GDP per capita ▪ Growth of GDP per capita	▪ Domestic market, return to capital, trade openness and liberalisation measures, infrastructural facilities and FDI have a positive impact on private investment. ▪ Government expenditure, macroeconomic uncertainty and political instability have a negative influence on private investment.
Frimpong and Marbuah (2010)	Ghana 1970 to 2002	ARDL approach	▪ Real GDP ▪ Public investment ▪ Credit to private sector ▪ Inflation rate	▪ In the short-run, the determinants of private investment are public investment, real exchange rate, real interest rate, openness, inflation and a regime of constitutional rule.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ External debt ▪ Real interest rate ▪ Trade liberalisation ▪ Real exchange rate	▪ In the long-run, the determinants of private investment are real output, inflation, external debt, openness, real interest rate, and real exchange rate.
Fowowe (2011)	Sub-Saharan African countries 1980 to 2006	Panel data analysis	▪ Financial reform index ▪ Growth rate of GDP ▪ Public investment ▪ Volatility of inflation	▪ Financial sector reforms have a positive effect on private investment.
Ajide and Lawanson (2012)	Nigeria 1970 to 2010	ARDL approach	▪ Public investment ▪ Real GDP ▪ Inflation rate ▪ Real exchange rate ▪ Real credit to the private sector ▪ Terms of trade ▪ External debt ▪ Foreign direct investment	▪ In the long-run, the determinants of private investment are public investment, real interest rate, real GDP, credit to the private sector, exchange rate, external debt and terms of trade. ▪ In the short-run, the determinants of private investment are public investment, terms of trade and real GDP.
Naa-Idar *et al.* (2012)	Ghana 1960 to 2010	ECM	▪ Foreign aid ▪ Real GDP ▪ Exchange rate ▪ Real private sector credit ▪ Political instability	Long- and short-run determinants of private investment are: ▪ Inflation ▪ Exchange rate ▪ Public investment

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ External debt ▪ Infrastructure ▪ Trade openness ▪ Public investment	▪ GDP ▪ Trade openness ▪ Foreign aid ▪ Private sector credit ▪ External debt
Shawa *et al.* (2012)	Sub-Saharan African	First-difference and the System GMM	▪ Current account deficit ▪ Credit to the private sector ▪ Inflation ▪ Per capita income ▪ Growth in per capita income ▪ Population growth ▪ Public investment ▪ Real interest rate ▪ Total debt service ▪ External debt ▪ Growth in terms of trade ▪ Trade openness ▪ Political index	▪ Current account deficit, inflation, per capita income growth, per capita income, public investment rate, real interest rate, population growth, total debt service/GDP, debt stock/GDP, trade openness, terms of trade growth and the political environment jointly have a significant impact on private investment.
Adugna (2013)	Ethiopia 1981 to 2010	OLS Model	▪ Public Investment ▪ Real GDP ▪ Inflation rate ▪ Real lending interest rate	In the long-run: ▪ Public investments, external debt and real GDP per capita have a positive effect on private investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ External debt ▪ Official exchange rate ▪ Trade as % of nominal GDP ▪ Corporate tax rate	▪ Lagged private investment has a negative effect on private investment. In the short-run: ▪ GDP per capita and external debt have a positive influence on private investment. ▪ Lagged inflation rate has a negative effect on private investment.
Ambaye *et al.* (2013)	Ethiopia 1992 to 2010	ARDL approach	▪ Real GDP ▪ Inflation rate ▪ Real exchange rate ▪ External debt stock ▪ Gross domestic saving ▪ Credit to private sector ▪ Government expenditure ▪ Foreign direct investment ▪ Gross fixed capital formation	▪ Domestic saving, exchange rate and domestic credit have a negative effect on private investment. ▪ Government expenditure and external debt have a significant and positive impact on private investment.
Michael and Aikaeli (2014)	Tanzania 1975 to 2010.	ECM	▪ Public investment ▪ Exchange rate ▪ Degrees of openness ▪ Lending rate ▪ Credit to the private sector ▪ GDP growth	The determinants of private investment are: ▪ public investment ▪ GDP growth ▪ credit to the private sector

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Molapo and Damane (2015)	Lesotho 1982 to 2013	ARDL approach	▪ Gross domestic expenditure deflator ▪ Public investment ▪ GDP per capita	In the long-run: ▪ Economic growth and public investment have a positive influence on private investment. ▪ General price level has a negative impact on private investment. In the short-run: ▪ Public investment has a positive effect on private investment.
Ngoma *et al.* (2019)	35 sub-Saharan African countries 2000 to 2017	Pooled regression, fixed effects and random effects models	▪ GDP growth rate ▪ Real interest rate ▪ Inflation rate ▪ Credit to private sector ▪ Government gross debt ▪ Public investment	The determinants of private investment are: ▪ GDP growth rate ▪ Interest rate ▪ Inflation rate ▪ Public investment
Ayeni (2020)	Gambia 1980 to 2019	ARDL approach	▪ Real GDP ▪ Public investment ▪ Credit to the private sector ▪ Inflation rate ▪ Average interest on new external debt ▪ Real interest rate ▪ Real exchange rate	In the long-run: ▪ Government investment, credit to the private sector and interest rate have a positive influence on private investment. ▪ Real GDP and exchange rate are found to have a negative impact on private investment. ▪ Inflation and external debt have insignificant impact on private investment In the short-run:

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
				▪ Credit to private sector, external debt and government investment are positive determinants of private investment. ▪ Exchange rate, interest rate and inflation are the negative determinants of private investment. ▪ Real GDP has insignificant impact on private investment.
Mose *et al.* (2020)	Kenya, Rwanda and Burundi 2009 to 2018	Panel data approach	▪ Public investment ▪ Credit to the private sector ▪ Real GDP per capita	▪ Credit to the private sector and real GDP per capita are positive determinants of private investment. ▪ Public investment is a negative determinant of private investment.

5.3.1.2 The determinants of private investment in other countries

This section reviews the empirical studies on the determinants of private investment in other countries. These studies include Sakr (1993), Mlambo and Oshikoya (2001), Ribeiro and Teixeira (2001), Valadkhani (2004), Acosta and Loza (2005), Erden and Holcombe (2006), Ang (2009), Karagoz (2010), Hassan and Salim (2011),Tan and Tang (2012), Al-Sadig (2013), Suhendra and Anwar (2014), Magableh and Ajlouni (2016), Lau, Tan and Liew (2019), Tung (2019), Akçay and Karasoy (2020).

In Pakistan, Sakr (1993) examined the determinants of private investment using annual data from 1973/74 to 1991/92. The results reveal that GDP growth, credit to the private sector, and government investment have a positive relationship with private investment. When public investment is disaggregated into infrastructural and non-infrastructural investment, the findings reveal that non-infrastructural investment is negatively related with private investment, and infrastructural investment is positively related to private investment.

In Brazil, Ribeiro and Teixeira (2001) investigated the determinants of private investment from 1956 to 1996. The findings of the study show that output, public investment and credit have a positive impact, while the exchange rate and inflation have a negative effect on private investment, and interest rate was found to be insignificant. In Brazil, Acosta and Loza (2005), for the period 1970 to 2000, found that in the short-run, exchange rate and trade liberalisation determine private investment, while in the long-run, it is determined by both credit markets and well-developed financials.

Using ARDL, Karagoz (2010) examined the determinants of private investments in Turkey for the period 1979 to 2005, and found that in the long-run, real GDP, private external debt and private sector credit to GDP are the positive determinants, while inflation, real exchange rate and trade openness are the negative determinants of private investment. Public investment and interest rate were found to be insignificant.

In another study for Turkey, Akçay and Karasoy (2020) examined the determinants of private investment for the period 1975 to 2014 using ARDL. The results indicate that democracy, output growth and financial development contribute positively to private investment. However, real interest rate, public investment and macroeconomic instability have a negative impact on private investment.

In Iran, Valadkhani (2004) using annual time-series data from 1960 to 2000, found that in the short-run, the growth of non-oil GDP is the main determinant of private investment. Hassan and Salim (2011) examined the determinants of private investment in Bangladesh and found that real interest rate is not significant in determining private investment, however, national output is significant in the long-run. The study also found that government expenditure is a significant determinant of private investment in both the long- and short-run.

In Malaysia, Ang (2009) examined the relationship between private domestic investment, public investment and foreign direct from 1960 to 2003, and found that in the long-run, public investment and FDI stimulate private domestic investment.

In another study conducted in Malaysia, Tan and Tang (2012) examined the dynamic relationship between private domestic investment, the user cost of capital, and economic growth using data from 1970 to 2009. The results reveal that user cost of capital has a negative impact on private domestic investment, while economic growth has a positive effect on private domestic investment in the long-run.

Suhendra and Anwar (2014) examined the determinants of private investment in Indonesia from 1990 to 2011, and found that the positive determinants are government investment, credit availability for private investment, exchange rate and economic growth. Interest rates and inflation were found to be the negative determinants.

Using ARDL, Magableh and Ajlouni (2016) examined the determinants of private investment using data from 1976 to 2012 in Jordan. They found that private investment is positively related to real GDP growth, while it is negatively related to real public investment and real interest rates.

Using the NARDL in Malaysia, Lau *et al.* (2019) examined the asymmetric effect of public debt on private investment for the period 1980 to 2016. The results show that there is some evidence of long-run asymmetry between private investment and external debt, total public debt and federal government debt. There is an asymmetric relationship between private investment and external debt, domestic debt and federal government debt in the short-run.

Tung (2019) examined the impact of FDI on private investment in Vietnam for the period 2003 to 2017. The findings reveal that in the long- and short-run, FDI and GDP

per capita have a positive influence on private investment, while inflation has a negative effect, and net export is insignificant.

Mlambo and Oshikoya (2001) examined the relationship between macroeconomic factors and private investment for 40 developing countries from Africa, East Asia, Latin America and South Asia for the period 1970 to 1996. The findings indicate that fiscal deficit, domestic credit to the private sector, the real exchange rate, and macroeconomic uncertainty had an impact on private investment.

Using data from 1980 to 1997, Erden and Holcombe (2006) investigated in 19 developing countries, the impact of public investment on private investment. The findings indicate that in the long-run, public investment has a positive impact on private investment, and is also positively related to real GDP. Private investment is found to be negatively related to uncertainty, while interest rate is insignificant. In the short-run, real GDP, real interest rate and uncertainty are insignificant, however, public investment and credit availability to the private sector have a significant impact on private investment.

In 91 developing host countries, Al-Sadig (2013) examined the effects of FDI inflows on private investment, using data from 1970 to 2000. The results reveal that FDI stimulates private domestic investment. Furthermore, the findings reveal that in low-income countries, the positive effects of FDI on private investment depend on the availability of human capital.

Table 5.2 summarises the empirical evidence on the determinants of private investment in other countries.

Table 5.2: Summary of the empirical literature on the determinants of private investment in other countries

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Sakr (1993)	Pakistan 1973/74-1991/92		▪ GDP ▪ Credit to private sector ▪ Government investment ▪ Non-infrastructure government investment ▪ Infrastructure government investment lagged by two years	▪ Credit to the private sector, GDP growth and government investment have a positive effect on private investment. ▪ Public non-infrastructural investment has a negative effect on private investment. ▪ Public infrastructural investment has a positive impact on private investment.
Mlambo and Oshikoya (2001)	40 developing countries from Africa, Latin America, East Asia and South Asia 1970 to 1996	Panel data regressions	▪ Real GDP growth ▪ Public investment ▪ Fiscal balance ▪ Real domestic credit to the private sector ▪ Real interest rate ▪ Real exchange rate ▪ External debt ▪ Uncertainty variables	▪ Domestic credit to the private sector, fiscal deficit, real exchange rate, and macroeconomic uncertainty have an effect on private investment.
Ribeiro and Teixeira (2001)	Brazil 1956 to 1996	ARDL	▪ Output ▪ Interest rate ▪ Public Investment ▪ External debt ▪ Exchange rate ▪ Credit	In the long- and short-run: ▪ Output, public investment and financial variables have a positive effect on private investment. ▪ Exchange rate has a negative effect on private investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Inflation	
Valadkhani (2004)	Iran 1960 to 2000	ECM	▪ Non-oil GDP ▪ Rate of inflation	▪ The growth of non-oil GDP is the main determinant of private investment in the short-run.
Acosta and Loza (2005)	Argentina 1970 to 2000	ECM	▪ GDP at constant prices ▪ Public investment ▪ External debt as % of GDP ▪ Trade liberalisation ▪ Real exchange rate ▪ Inflation rate ▪ Relative price investment/ consumption ▪ Credit to the private sector	In the short-run the determinants of private investment are: ▪ Exchange rate ▪ trade liberalisation In the long-run the determinants of private investment are: ▪ Well-developed financial and credit markets
Erden and Holcombe (2006)	19 developing countries 1980 to 1997	ECM	▪ Real GDP ▪ Real Interest rate ▪ Public Investment ▪ Uncertainty ▪ Credit to the private sector	In the long-run: ▪ Private investment is positively related with public investment and real GDP. ▪ Private investment is negatively related to uncertainty. In the short-run: ▪ Public investment and credit availability to the private sector have a significant impact on private investment.
Karagoz (2010)	Turkey 1979 to 2005	ARDL approach	▪ GDP ▪ Real exchange rate ▪ Public investment	In the long-run the determinants of private investment are: ▪ Real GDP

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Interest rate ▪ Credit to the private sector ▪ Private sector external debt ▪ Inflation rate ▪ Trade openness	▪ Ratio of private sector credit to GDP ▪ Real exchange rate ▪ Private external debt ▪ Trade openness ▪ Inflation
Ang (2009)	Malaysia 1960 to 2003	Vector autoregressive (VAR) model	▪ Public investment ▪ Foreign direct investment	▪ Public investment and FDI stimulate private investment.
Hassan and Salim (2011)	Bangladesh	Error correction model	▪ Government expenditure ▪ Real GDP ▪ Long-term loan ▪ Real interest rate ▪ Terms of trade	In the long-run: ▪ Real GDP is a determinant of private investment. In the long- and short-run: ▪ Government expenditure is a determinant of private investment.
Tan and Tang (2012)	Malaysia 1970 - 2009	Vector error correction model	▪ Real GDP ▪ User cost of capital	In the long-run ▪ Economic growth has a positive effect on private investment. ▪ User cost of capital has a negative effect on private investment.
Al-Sadig (2013)	91 developing host countries 1970 to 2000	System generalised method of moments	▪ Foreign direct investment ▪ Real GDP growth ▪ Inflation rate ▪ Trade openness ▪ Money & quasi-money (M2)	▪ FDI stimulates private domestic investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ External debt ▪ School enrolment ▪ Democracy	
Suhendra and Anwar (2014)	Indonesia 1990 to 2011	Multiple regression method using panel data	▪ Government investment ▪ Interest rate ▪ Inflation rate ▪ Credit to private investors ▪ Exchange rate ▪ Economic growth	The positive determinants of private investment are: ▪ Government investment ▪ Exchange rate ▪ Credit availability for private investment ▪ Economic growth The negative determinants of private investment are: ▪ Inflation ▪ Interest rate
Magableh and Ajlouni (2016)	Jordan 1976 to 2012	ARDL approach	▪ Real GDP ▪ Real interest rate ▪ Real public investment	In the long- and short-run: ▪ Private investment is positively related to real GDP growth. ▪ Private investment is negatively related to real public investment and real interest rate.
Lau *et al.* (2019)	Malaysia 1980 to 2016	NARDL	▪ Total government debt ▪ Total domestic debt ▪ Total external debt ▪ Federal government debt ▪ Interest rate	In the long-run: ▪ There is asymmetry relationship between private investment and total public debt, external debt and federal government debt. In the short-run:

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Domestic credit to the private sector	▪ There is asymmetric relationship between private investment and domestic debt, external debt and federal government debt.
Tung (2019)	Vietnam 2003 to 2017	ECM	▪ Foreign direct investment ▪ GDP per capita ▪ Net exports ▪ Inflation	In the long- and short-run: ▪ Foreign direct investment and GDP per capita have a positive influence on private investment. ▪ Inflation has a negative impact on private investment.
Akçay and Karasoy (2020)	Turkey 1975 to 2014	ARDL approach	▪ Real GDP ▪ Real interest rate ▪ Public investment ▪ Macroeconomic instability ▪ Credit to the private sector ▪ Democracy indices	▪ There is positive relationship between democracy and private investment. ▪ Financial development and output growth have a positive impact on private investment. ▪ Macroeconomic instability, real interest rate and public investment have a negative impact on private investment.

Overall, the empirical studies, conducted in African countries and other countries outside Africa, indicated that economic growth and public investment are mostly the positive determinants, and are significantly associated with private investment in both the long- and short-run (Asante, 2000; Ribeiro & Teixeira, 2001; Ouattara, 2005; Erden & Holcombe, 2006; Lesotlho, 2006; Ang, 2009; Tan & Tang, 2012; Adugna, 2013; Michael & Aikaeli, 2014; Suhendra & Anwar, 2014; Magableh & Ajlouni, 2016; Ngoma *et al.,* 2019). The findings are similar, irrespective of whether the countries studied are high-income, upper-income or low-income countries. The proxies that are widely used for economic growth are GDP growth rate and GDP per capita. However, there are studies where economic growth was found to have an insignificant effect on private investment in the short-run (Erden & Holcombe, 2006), and where public investment also had an insignificant impact (Mitiku, 1996; Karagoz, 2010).

There are also studies that have found that public investment has a negative and significant effect on private investment (Magableh & Ajlouni, 2016; Ngoma *et al.,* 2019; Akçay & Karasoy, 2020). On the other hand, inflation was found to be the most negative, and significantly associated with private investment in both the long- and short-run (Ribeiro & Teixeira, 2001; Karagoz, 2010; Valadkhani, 2004; Adugna, 2013; Suhendra & Anwar, 2014; Ngoma *et al.*, 2019). The findings are the same, regardless of whether the countries are high-income, upper-middle income or low-income countries. However, it was also found to have a negative and significant effect on private investment (Adugna, 2013; Suhendra & Anwar, 2014).

The determinant that was mostly found to have an insignificant effect on private investment is interest rates (Mitiku, 1996; Ribeiro & Teixeira, 2001; Erden & Holcombe, 2006; Karagoz, 2010; Adugna, 2013; Michael & Aikaeli, 2014). The results also showed that in some studies, interest rate is negatively related with private investment (Suhendra & Anwar, 2014; Magableh & Ajlouni, 2016). The findings are the same regardless of whether the countries are high-income, upper-middle income or low-income countries.

The availability of funds and credit to the private sector was also found to be a determinant of private investment. Asante (2000) and Misati and Nyamongo (2011) found that it has a positive impact, while Karagoz (2010) found that it has a positive influence in the long-run. In a separate study, Erden and Holcombe (2006) found that

credit to the private sector is a positive determinant in the short-run, while Ouattara (2005) established a negative relationship in the long-run.

The variables that are related to trade, such as terms of trade, trade openness and exchange rates, have been found to determine private investment. However, the literature review revealed mixed findings where the variables are found to have a positive, negative or insignificant effect on private investment. Although these variables were found to be positive, and had a significant effect, in certain instances (Ambachew, 2010; Suhendra & Anwar, 2014), they were mostly negative, and significant in most studies (Ribeiro & Teixeira, 2001; Ouattara, 2005; Karagoz, 2010; Ambaye *et al.,* 2013). However, some studies have found that the variables have an insignificant effect on private investment (Mitiku, 1996; Adugna, 2013; Michael & Aikaeli, 2014).

The other variables that have been established as being determinants of private investment include external debt and financial development that has been established to have positive influence, while political instability was found to have a negative influence (Ambachew, 2010; Adugna, 2013; Lau *et al.,* 2019; Akçay & Karasoy, 2020).. As can be seen from the reviewed studies, the empirical evidence on the determinants of private investment is inconclusive and this could be attributed to differences in the estimation methods used as well as the sample periods and countries studied. Although there are many studies conducted on the determinants of private investment in African countries, specific studies in South Africa, Botswana and Malawi are limited. Therefore, the study aims to fill this gap by conducting a study on the determinants of domestic private investment in the three selected countries.

5.3.2 Empirical literature on the crowding effect of public investment on private investment

Although there are many studies on the impact of public investment on private investment, the crowding effect of public investment on private investment is still uncertain. According to Saeed, Hyder and Ali (2006), the Classical economists believed that public investment crowds out private investment, while the Keynesians claimed that public investment crowds in private investment. There are studies, such as those of Odedokun (1997), Pereira (2001), Ramirez and Nazmi (2003), and Erden and Holcombe (2005) that found that public investment crowds in private investment,

while the studies of Karagöl (2004), Acosta and Loza (2005), Mitra (2006), and Dash (2016) indicated that public investment crowds out private investment. Some studies that examined the crowding in and out effects of public investment on private investment are discussed in this section.

In Pakistan, using data from 1964 to 2001, Hyder (2001) examined the crowding out hypothesis, and found that there is a complementary relationship between public and private investment, which suggests that an increase in public investment will lead to an increase in private investment.

Using a panel of 14 OECD countries for the period 1979 to 1988, Argimón, González-Páramo and Roldán (1997) examined the relationship between government spending and private investment, and found that public investment crowds in private investment. Pereira (2001) examined the effects of public investment on private investment in the United States, and found that aggregate public investment crowds in private investment.

Using data from 1964-65 to 2004-05, Rashid (2005) found that there is a positive relationship between public and private investment in the long-run in Pakistan. Kuştepeli (2005), while using data from 1967 to 2003, analysed the effectiveness of fiscal spending in Turkey, and found that government spending crowds in private investment.

Akber, Gupta and Paltasingh (2020) examined the crowding effects of public investment on private investment in India, using data from 1970 to 2016, and the NARDL methodology. The study found that in the long- and short-run, public investment crowds in private investment. In a study based on 19 developing countries, Erden and Holcombe (2005) examined whether public investment crowds in or out private investment, using data from 1980 to 1997, and found that public investment complements private investment.

In Turkey, Karagöl (2004) disaggregated government expenditures into government consumption and public investment, and examined the crowding impact on private investment for the period 1968 to 2000. The study found that public investment and government consumption crowds out private investment. Also in Turkey, using data from 1980 to 2005, Başar and Temurlenk (2007) investigated the crowding out effect of government spending on private sector investment, and found that government

spending has a crowding out effect on private investment. Using data from 1969 to 2005 in India, Mitra (2006) investigated whether government investment has crowded out private investment, and found that government investment crowds out private investment.

In Brazil, from 1947 to 1990, Cruz and Teixeira (1999) analysed the impact of public investment on private investment, and concluded that public investment crowds out private investment in the short-run, while in the long-run, the two variables complement each other. In Vietnam, Nguyen and Trinh (2018) examined the impact of public investment on economic growth and private investment using the ARDL model from 1990 to 2016. The findings indicate that, in the short-run, public investments have a crowding in effect on private investments, but a crowding out effect in the long-run.

Using data from 1970 to 2013 in India, Dash (2016) found that public investment crowds out private investment in the long- and short-run, while public infrastructure indicated by the km of roads per capita, crowds in private investment in the short-run.

Makuyana and Odhiambo (2019) examined the crowding in or out effects of public investment on private investment, employing the ARDL approach, with data from 1970 to 2014 in Malawi. The study found that in the short-run, gross public investment has a crowding out effect. When it is disaggregated into infrastructural and non-infrastructural public investment, it is revealed that infrastructural public investment crowds in private investment in the long-run, while it crowds out in the short-run. The non-infrastructural public investment has no effect on private investment in the long- and short-run.

Using data from 1970 to 2017 for South Africa, Makuyana and Odhiambo (2018) found that gross public investment crowds out private investment, while infrastructural public investment crowds in private investment in the long-run. In the short-run, gross public investment and non-infrastructural public investment are found to crowds out private investment.

Other studies have found public investment to not have a significant effect on private investment. In Cameroon, using data from 1980 to 2012, to examine the relationship between public expenditure and private investment, Forgha and Mbella (2013) found that public expenditure is insignificant in crowding in private investments.

Table 5.3 presents a summary of the empirical evidence on the crowding in or out of public investment on private investment.

Table 5.3: Summary of the empirical literature on the crowding in/out of public investment on private investment

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Argimón *et al*. (1997)	14 OECD countries 1979 to 1988	Panel data analysis	▪ Public investment ▪ Public consumption	▪ Public investment crowds in private investment.
Cruz and Teixeira (1999)	Brazil 1947 to 1990	ECM	▪ GDP ▪ Public investment ▪ Interest rate	In the short-run: ▪ Private investment is crowded out by public investment. In the long-run: ▪ Private and public investment complement each other.
Hyder (2001)	Pakistan 1964 to 2001	Vector error-correction framework	▪ Real GDP ▪ public investment	▪ Complementary relationship between private and public investment.
Pereira (2001)	United States 1956 to 1997	Vector autoregressive technique	▪ GDP ▪ Public investment	▪ Public investment crowds in private investment.
Karagöl (2004)	Turkey 1968 to 2000	Vector autoregressive (VAR)	▪ Real GDP ▪ Public investment ▪ Government consumption	▪ Public investment crowds out private investment.
Erden and Holcombe (2005)	19 developing countries 1980-1997	Several pooled specification of standard investment model	▪ Expected real GDP ▪ Real public investment ▪ Real interest rate ▪ Economic freedom ▪ Uncertainty	▪ Public investment crowds in private investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
			▪ Lagged private investment	
Kuştepeli (2005).	Turkey 1967 to 2003	VAR model	▪ Government spending ▪ GDP ▪ Real interest rate	In the long-run: ▪ Government spending crowds in private investment.
Rashid (2005)	Pakistan 1964-65 to 2004-05	ECM	▪ GDP ▪ Public investment ▪ Rate of interest	In the long-run: ▪ Public investment crowds in private investment.
Mitra (2006)	India 1969 to 2005	Structural vector autoregression model	▪ Government investment ▪ GDP	▪ Government investment crowds out private investment.
Başar and Temurlenk (2007)	Turkey 1980 to 2005	Structural VAR (SVAR) model.	▪ Per capita real GNP ▪ Per capita ▪ Real government expenditures without interest payments	▪ Government spending crowds out private investment.
Forgha and Mbella (2013)	Cameroon 1980 to 2012	Vector autoregressive technique	▪ Public investment ▪ Domestic credit to private sector ▪ Real interest rate ▪ Real GDP growth	▪ Public expenditure insignificantly crowds in private investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Dash (2016)	India 1970 to 2013	ARDL approach	▪ Public investment ▪ Lending rate ▪ Bank credit ▪ Relative price of investment ▪ Deposit rate ▪ Growth rate	In the long-run: ▪ Public investment crowds out private investment. In the short-run: ▪ Public investment crowds out private investment. ▪ Public infrastructure crowds in private investment in the short-run.
Makuyana and Odhiambo (2018).	South Africa 1970 to 2017	ARDL approach	▪ Public investment ▪ Economic progress ▪ Domestic credit to the private sector ▪ Terms of trade ▪ Inflation ▪ Infrastructural and non-infrastructural public investment	In the long-run: ▪ Gross public investment crowds out private investment. ▪ Infrastructural public investment crowds in private investment. In the short-run: ▪ Gross public investment crowds out private investment. ▪ Non-infrastructural public investment crowds out private investment.
Nguyen and Trinh (2018)	Vietnam 1990 to 2016	ARDL approach	▪ GDP at current prices ▪ SOEs investment ▪ Public investment ▪ State-owned capital stock ▪ Real interest	In the long-run: ▪ Public investment crowds out private investment. In the short-run: ▪ Public investment crowds in private investment.

Author(s)	Region/country and sample period	Methodology	Explanatory variables	Findings
Makuyana and Odhiambo (2019)	Malawi 1970 to 2014	ARDL	▪ Public investment ▪ Real interest rate ▪ Domestic credit to the private sector ▪ Exports ▪ Inflation rate ▪ Infrastructural and non-infrastructural public investment	In the long-run: ▪ Infrastructural public investment crowds in private investment. ▪ Non-infrastructural public investment has no effect on private investment. In the short-run: ▪ Gross public investment crowds out private investment. ▪ Infrastructural public investment crowds out private investment. ▪ Non-infrastructural public investment has no effect on private investment.
Akber et al. (2020)	India 1970 to 2016	NARDL	▪ Public investment ▪ Credit to the private sector ▪ Total savings ▪ Inflation volatility ▪ Lending rate ▪ Expected output ▪ FDI inflow	In the long- and short-run: ▪ Public investment crowds in private investment.

Although there are modest studies that have examined the effects of the crowding in or out of public investment on private investment, the findings are still inconclusive. The effects are found to be different due to the type of government expenditure used, methodology, as well as the region and the period of the study. However, the majority of the studies examining the effect of government spending on private investment that has been reviewed found the crowding in effect. The studies that have found that government spending or investment crowds in private investment include those of Argimón *et al*. (1997), Pereira (2001), and Kuştepeli (2005). However, some studies examining the effect of government spending on private investment, such as those of Karagöl (2004) Başar and Temurlenk (2007), Mitra (2006) and Dash (2016) found different results for the crowding out effect. There are also studies such as that of Nguyen and Trinh (2018) that found mixed results in terms of the crowding in or out effects of government expenditure on private investment.

5.3.3 Empirical literature on the causality between private investment and its determinants

This section reviews the empirical studies that have examined the causality between private investment and its determinants. While the causal relationship between private investment and its determinants has been investigated in a number of studies, the results are inconsistent. Some studies have found unidirectional causality from private investment to the determinants, and from the determinants to private investment. Others have found a bidirectional causality between the two variables, which means that they cause each other, and no causality between private investment and its determinants, which means that the variables are independent and do not cause each other.

Studies, such as those of Tan and Tang (2012), Muyambiri *et al.* (2012), Molapo and Damane (2015), and Ari, Akkas, Asutay and Koç (2019) found unidirectional causality from private investment to its determinants. Muyambiri *et al.* (2012) examined the relationship between private and public investment in Zimbabwe, for the period 1967 to 2004. The findings from the Granger-causality test revealed that there is unidirectional causality from private to public investment. Also using the Granger-causality test and data from 1970 to 2009, Tan and Tang (2012) found that unidirectional causality runs from private domestic investment to economic growth, and to the user-cost of capital in the long-run in Malaysia. In the short-run, there is bi-

directional causality between private domestic investment and user cost of capital, and between private domestic investment and economic growth.

In Lesotho, Molapo and Damane (2015) examined the direction of causality between private investment and its determinants, using the Granger-causality test for the period 1982 to 2013, and found that there is a unidirectional causal flow from private investment to GDP per capita.

Using the Toda-Yamamoto (TY) Granger-causality test, Ari *et al.* (2019) examined the causal relationship between public investment and private investment in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) for the period 1960 to 2015. They found that in two of the counties, Bahrain and Kuwait, there is unidirectional causality running from private to public investment.

On the other hand, studies such as those of Hyder (2001), Aurangzeb and Haq (2012), Xu and Yan (2014), and Ari *et al.* (2019) found causality to run from the determinants to private investment. Hyder (2001) examined the causal relationship between GDP, public investment and private investment in Pakistan, from 1964 to 2001, using the Granger-causality test. The results indicated that there is unidirectional causality from public investment to private investment, and from economic growth to private investment. Using the Granger-causality test, Aurangzeb and Haq (2012) examined the causal relationship between investments and economic growth in Pakistan for the period 1981 to 2010 using the Granger-causality test, and found unidirectional causality running from economic growth to private investment.

Xu and Yan (2014) investigated the causal relationship between private investment and disaggregated government investment in China for the period 1980 to 2011, using the Granger-causality test. They found that there is unidirectional causality from government investment in public goods to private investment. Ari *et al.* (2019) examined the causal relationship between public investment and private investment in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE for the period 1960 to 2015. Using the TY Granger-causality test, the study found that in Bahrain, Oman there is unidirectional nonlinear causality running from public to private investment.

Studies, such as those of Erenburg and Wohar (1995), Tan and Tang (2012), Xu and Yan (2014), Molapo and Damane (2015), and Ari *et al.* (2019) found a bidirectional causality between private investment and its determinants. Erenburg and Wohar

(1995), while examining the causal relationship between private and public investment used the multivariate Granger-causality testing procedure for the period 1954 to 1989, and the findings suggest the presence of feedback affects public and private investment. In Malawi, Mataya and Veeman (1996) analysed the investment behaviour in Malawi's private and public goods sectors between 1967 and 1988, and used the Granger-causality test to assess whether unidirectional or bidirectional causality exists between private and public investment. The study found that there is a bidirectional causality between private and public investment.

Nazlioglu, *et al*. (2009) investigated the causality between investment and financial development in Turkey in both the short- and long-run using quarterly data from 1987-1 to 2007-1. Using the Dolado and Lutkepohl test of Granger-causality, the study found that there is a bidirectional causality between private investment and financial development. Using the Granger-causality, Xu and Yan (2014) found there is bidirectional causality between government investment in private goods and private investment in China. Also using the Granger-causality test, Molapo and Damane (2015) found there is bidirectional causality between private investment and government investment

Ari *et al.* (2019) examined the causal relationship between public investment and private investment in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE for the period 1960 to 2015. The study used the TY Granger-causality test and found that in the UAE, there is bidirectional causality between public and private investment. In terms of nonlinear causality, the results show bidirectional causality between public and private investment in Saudi Arabia and the UAE.

Olaifa and Benjamin (2020) examined the relationship between government capital expenditure and private investment in Nigeria using time series data from 1981 to 2016. The study used the Toda-Yamamoto (T-Y) causality test to find the direction of causality between government capital expenditure and private investment. The results of the causality test revealed that there is a bidirectional causality between private sector investment and government capital expenditure.

On the other hand, using the Granger-causality test, Keho and Echui (2011) found that public investment in transport infrastructure does not cause private investment both in the short- and long-run, in Côte d'Ivoire for the period 1970 to 2002. Molapo and

Damane (2015) found that there is no causality between private investment and general price level while examining the direction of causality between private investment and its determinants, using the Granger-causality test in Lesotho for the period 1982 to 2013.

In Tanzania, Mabula and Mutasa (2019) examined the effect of public debt on private investment for the period of 1970 to 2016. The Granger-causality test results showed that there is no causal relationship between private investment and domestic debt, external debt, debt service and private consumption expenditure.

Table 5.4 summarises the empirical studies on the causal relationship between private investment and its determinants.

Table 5.4: Summary of the empirical literature on the causality between private investment and its determinants

Author(s)	Region/country and sample period	Methodology	Direction of Causality
Studies that found unidirectional causality from private investment to determinants			
Muyambiri *et al.* (2012)	Zimbabwe 1967 to 2004	Granger-causality test	Private investment → public investment
Tan and Tang (2012)	Malaysia 1970 – 2009	Granger-causality test	In the long-run: Private domestic investment → economic growth Private domestic investment → user cost of capital
Molapo and Damane (2015)	Lesotho 1982 to 2013	Granger-causality test	Private investment → GDP per capita
Ari *et al.* (2019)	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE 1960 – 2015	TY Granger-causality test	Private investment → public investment (Bahrain and Kuwait)
Studies that found unidirectional causality from determinants to private investment			
Hyder (2001)	Pakistan 1964 – 2001	Granger-causality test	Private investment ← economic growth Private investment ← public investment
Aurangzeb and Haq (2012)	Pakistan 1981 – 2010	Granger-causality test	Private investment ← economic growth

Author(s)	Region/country and sample period	Methodology	Direction of Causality
Xu and Yan (2014)	China 1980 – 2011	Granger-causality test	Private investment ← government investment in public goods
Ari *et al.* (2019)	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE 1960 – 2015	TY Granger-causality test	Nonlinear causality: Private investment ← public investment t (Bahrain, Oman and Qatar)
Studies that found bidirectional causality between private investment and determinants			
Erenburg and Wohar (1995)	1954 to 1989	Multivariate Granger-causality	Private investment ↔ public investment
Mataya and Veeman (1996)	Malawi 1967 to 1988	Granger-causality test	Private investment ↔ public investment
Nazlioglu *et al*. (2009)	Turkey 1987-1 to 2007-1.	Dolado and Lutkepohl test of Granger-causality	Private investment ↔ financial development
Tan and Tang (2012)	Malaysia 1970 – 2009	Granger-causality test	In the short-run: Private domestic investment ↔ user cost of capital Private domestic investment ↔ economic growth
Xu and Yan (2014)	China 1980 – 2011	Granger-causality test	Government investment in private goods ↔ private investment

Author(s)	Region/country and sample period	Methodology	Direction of Causality
Molapo and Damane (2015)	Lesotho 1982 to 2013	Granger-causality test	private investment ↔ government investment
Ari *et al.* (2019)	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE 1960 – 2015	TY Granger-causality test	Public investment ↔ private investment (Oman, Qatar, UAE) Nonlinear causality: Public investment ↔ private investment (Saudi Arabia and UAE)
Olaifa and Benjamin (2019)	Nigeria 1981 to 2016	TY causality test	Private sector investment ↔ government capital expenditure
Studies that found no causality between private investment and determinants			
Keho and Echui (2011)	Côte d'Ivoire 1970 to 2002	Granger-causality test	Private investment ≠ public investment in transport
Molapo and Damane (2015)	Lesotho 1982 to 2013	Granger-causality test	Private investment ≠ general price level
Mabula and Mutasa (2019)	Tanzania 1970 to 2016	Granger-causality test	Private investment ≠ domestic debt, external debt, debt service and private consumption expenditure

Notes: ↔ is bidirectional causality; → and ← is unidirectional causality and ≠ is no causality.

The findings on the causal relationship between private investment and its determinants, although limited, show that all four possible outcomes on the analysis have found support in empirical literature. Thus, there is empirical evidence of unidirectional causality from private investment to its determinants, and from the determinants to private investment; bidirectional causality between private investment and its determinants, and no causality between private investment and its determinants. However, despite the researcher in the current study's best efforts, the study did not find studies of the causal effect on some of the determinants. The effects of the causality also differ in the long- and short-run, and cut across various country incomes, for instance, it was found that private investment causes user cost of capital in the long-run, while in the short-run, there is bidirectional causality between the two variables.

Economic growth is found to have a causal relationship with private investment (Hyder, 2001; Tan & Tang, 2012). Most of the studies found unidirectional causality from economic growth to private investment (Hyder, 2001; Aurangzeb & Haq, 2012). However, there are other studies that have found bidirectional causality between the two variables (Tan & Tang, 2012).

Regarding public investment as a determinant of private investment, it has been found that there is unidirectional causality running from private investment to public investment (Muyambiri *et al.,* 2012; Ari *et al.*, 2019), while others found the opposite to be true (Hyder, 2001). However, there are also other studies that found the variables to be causing each other (Erenburg & Wohar, 1995; Molapo & Damane, 2015; Ari *et al.*, 2019).

All the studies that have been reviewed used the Granger-causality test, and the view is that most of the studies have found a bidirectional causality between private and public investment. It can also be seen that the causal relationship between private investment and its determinants has not received much attention in the countries under study, which are South Africa, Botswana and Malawi.

5.4 CONCLUSION

This chapter provided a discussion of the theoretical and empirical literature reviews on the determinants of private investment. Based on various theories of investment

reviewed, the different factors that can affect the level of private investment are revealed. These include interest rates and output. Therefore, it can be seen that there are different factors that can affect the level of investment in an economy.

The Neoclassicals believe that the desired capital stock is determined by output and the price of the capital, while the Q theory states that the level of investment is determined by the relationship between the increase in the value of the firm due to the installation of an additional unit of capital and its replacement cost.

The theories have, however, been criticised based on their assumptions. The Accelerator theory has an assumption of fixed prices. However, the Neoclassical theory has fixed expectations about future prices, output, and interest rates, but this may be regarded as not entirely accurate, as investment is a progressive process and it changes with time. Unlike the Neoclassical theory, the Q theory has been criticised for its assumptions that firms will increase installation cost, which is not certain because investment projects are not stable.

From the empirical literature review, it can be seen that the determinants of private investment vary across different countries. The studies have established that credit to the private sector, interest rates, public investment, inflation, GDP growth, terms of trade, savings, external debt, and exchange rate are some of the determinants of private investment. However, the findings are inconclusive, as in some countries, the determinants are found to have a negative effect, while in others, the same determinants are found to have a positive effect. Similarly, in others, it has no significant effect on private investment in developed and developing countries.

Despite being inconclusive, of the established determinants, economic growth, public investment and credit to the private sector were mostly positive determinants, while inflation, real interest rate and exchange rate were mostly negative determinants. The findings also differ significantly across the countries that are on the same level of development, depending of the methodology used and period of study. There are also a few studies that have been done in South Africa, Botswana and Malawi, pointing to the limited literature, and hence, the need to conduct the study on the determinants of private investment in the selected countries.

While many studies have been conducted on the crowding in or out effects of government spending on private investment, their findings are inconclusive. The

findings of some of the empirical studies reveal that the effects of government spending on private investment is positive, while the others finds it to be negative, and others statistically insignificant. In terms of the causal relationship, the findings are also inconclusive, as some studies have found that determinants, such as public investment and economic growth, cause private investment, while others have concluded the opposite, depending on the country being studied. However, there has not been much emphasis on the private investment's causal relationship with its determinants, as shown by the number of studies reviewed. Nevertheless, in the main, the bidirectional causality between private investment and its determinants was found to be predominant.

CHAPTER 6

EMPIRICAL MODEL SPECIFICATION AND ESTIMATION TECHNIQUES

6.1 INTRODUCTION

This chapter specifies the framework for investigating the determinants of domestic private investment in South Africa, Botswana and Malawi. The chapter is organised as follows: Section 6.2 specifies the model for the determinants of domestic private investment, the crowding impact of public investment on private investment model and the multivariate Granger-causality model. Section 6.3 presents the estimation techniques for the determinants of domestic private investment, the crowding impact of public investment on private investment, and the multivariate Granger-causality model as well as sources of data. Lastly, Section 6.4 concludes the chapter.

6.2 EMPIRICAL MODEL SPECIFICATION

The models that are specified and run for each country separately are discussed in this section. Section 6.2.1 discusses the model that is used to examine the determinants of domestic private investment in each country using the ARDL approach, while Section 6.2.2 discusses the model to examine whether public investment crowds in or out private investment using both the ARDL and NARDL approach. Section 6.2.3 discusses the model that is to be estimated for each country to examine the causal relationship between domestic private investment and its determinants.

6.2.1 Model 1: The determinants of domestic private investment

Following the work of Wai and Wong (1982), Zebib and Muoghalu (1998), and Mutenyo, Asmah and Kalio (2010), the study adopted the flexible accelerator theory to establish the determinants of domestic private investment. The flexible accelerator theory function is assumed to be:

$$K_t^* = \alpha Y_t^* \quad \ldots\ldots 6.1$$

Where, K_t^* is the desired capital stock in period t, and Y_t^* is the level of expected output in period t.

The gross fixed capital investment of the private sector is expressed as follows (Mutenyo *et al.,* 2010):

$$\Delta PrvI_t = \beta(PrvI_t^* - PrvI_{t-1}) \quad \ldots\ldots 6.2$$

Or

$$PrvI_t = \beta PrvI_t^* + (1-\beta)PrvI_{t-1} \quad \ldots\ldots 6.3$$

Where $PrvI_t^*$ is the desired level of gross private investment, $Pinv$ is the actual level of private investment, and β is the coefficient of adjustment where $0 \leq \beta \leq 1$

Gross investment is given as[5]:

$$PrvI_t^* = \Delta K_t^* + \gamma K_{t-1}^* \quad \ldots\ldots 6.4$$

Since $\Delta K_t^* = K_t^* - K_{t-1}^*$ then

$$PrvI_t^* = K_t^* - K_{t-1}^* + \gamma K_{t-1}^* \quad \ldots\ldots 6.5$$

Equation 6.5 can be simplified as:

$$PrvI_t^* = K_t^* - (1-\gamma)K_{t-1}^* \quad \ldots\ldots 6.6$$

Introducing the lag operator:

$$PrvI_t^* = [1-(1-\gamma)L]K_t^* \quad \ldots\ldots 6.7$$

Where L is the lag operator, and is stated as $LK_t^* = K_{t-1}^*$; γ is the depreciation rate of the capital stock.

Combining equation 6.2 and 6.7 gives:

$$\Delta PrvI_t^* = \beta[1-(1-\gamma)L]\,K_t^* - \beta PrvI_{t-1} \quad \ldots\ldots 6.8$$

Using the definition, $\Delta Pinv_t^* = Pinv_t - Pinv_{t-1}$,

$$PrvI_t - PrvI_{t-1} = \beta[1-(1-\gamma)L]\,K_t^* - \beta PrvI_{t-1} \quad \ldots\ldots 6.9$$

$$PrvI_t = \beta[1-(1-\gamma)L]\,K_t^* + (1-\beta)PrvI_{t-1} \quad \ldots\ldots 6.10$$

[5] see also Muthu (2017), Muyambiri & Odhiambo (2018)

If K_t^* from equation 6.1 is substituted into equation 6.7, the desired level of investment is written as:

$$PrvI_t = \alpha\beta[1-(1-\gamma)L]\, Y_t^* + (1-\beta)PrvI_{t-1} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .6.11$$

Using equation 6.11, following Oshikoya (1994) and Ghura and Goodwin (2000), the general empirical model of domestic private investment, as a function of desired level of output and other determinants, is specified as follows:

$$PrvI_t = \alpha_0 + \beta_1 PubI_t + \beta_2 Y_t + \beta_3 Cred_t + \beta_4 Int_t + \beta_6 Inf_t + \beta_6 TO_t + \beta_7 PrvI_{t-1} + \mu_{1t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 6.12$$

Where: $PrvI$ - private investment; Y - economic growth; $PubI$ - public investment; $Cred$ - credit to the private sector; Int - real interest rate; Inf - inflation rate; TO - trade openness.

The dependent variable is domestic private investment, which is measured by the private sector's gross fixed capital formation as a percentage of GDP for equation 6.12, and the independent variables are public investment, economic growth, domestic credit to the private sector, inflation rate, real interest rate and trade openness. The equation is estimated for each country in the study.

The motivation for the inclusion of the variables in the model is based on the theoretical and empirical literature that explains the relationship between private investment and each of the determinants that has been included in the model, as discussed below.

Real GDP per capita is used as a proxy for economic growth. GDP per capita is gross domestic product divided by midyear population and GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products (World Bank, 2021). Some studies such as Tan and Tang (2012) have found that economic growth positively influences the level of private investment. This is due to the fact that as the economic growth improves and there is development in the country, the demand will increase and business will invest more to produce more goods and services. Therefore, the relationship between the two variables is expected to be positive.

Public investment is measured by government gross fixed capital formation as a percentage of GDP. Gross fixed capital formation includes land improvements; purchases of equipment; and the construction of roads, railways, schools, offices

and hospitals (World Bank, 2021). Public investment is included in the model to determine whether public investment crowds in or out private investment in South Africa, Botswana and Malawi. According to Greene and Villanueva (1991), at theoretical level, public investment may be complementary to private investment, particularly where public investment involves useful infrastructure. It can also crowds out private investment, especially, when government invests in goods that are in competition with the private sector (Green & Villanueva, 1991). Studies that have included public investment in the factors determining private investment include those of Oshikoya (1994), and Magableh and Ajlouni (2016). Therefore, public investment can either be a positive or a negative determinant of private investment in this study.

The domestic credit to private sector as a percentage of GDP is used to measure the credit to the private sector. Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment (World Bank, 2021). The domestic credit to private sector has also been found to influence the level of private investment. Studies (Oshikoya, 1994) have found that access to credit by the private sector has increased the investment level. As investors have access to credit to finance their projects, the investment level will increase. Increased credit to the private sector is likely to boost private sector investment as financing opportunities through the banks encourage and support businesses with finance. The study's expectation is that domestic credit to private sector is a positive determinant of private investment.

The real interest rate is measured by the lending rate adjusted for inflation which is the bank rate that usually meets the short- and medium-term financing needs of the private sector and is normally differentiated according to creditworthiness of borrowers and objectives of financing (World Bank, 2021). The real interest rate is used as a proxy for the user cost of capital. For the developing countries in this study, the impact of interest rates on private investment is ambiguous. This is because, under the neoclassical investment model, real interest rate's effect on private investment can be negative, as it is regarded as an important component of user cost of capital. It can also have a positive effect, as some argue that real interest rate increases the flow of bank credit, which complements private investment; known as the McKinnon and Shaw complementary hypothesis (Frimpong & Marbuah, 2010). Studies such as

Greene and Villanueva (1991) confirmed the inverse relationship between private investment and real interest rate, while Frimpong and Marbuah (2010) found support for the complementary hypothesis. Therefore, real interest rate is expected to be either a positive or a negative determinant of private investment in this study.

Inflation is measured by the consumer price index (CPI). It reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly (World Bank, 2021). Inflation is used as a proxy for uncertainty in the economy, and it can have an adverse impact on private investment. According to Hassan and Salim (2011), inflation reduces the purchasing power of money, so people save less, and this leads to less funds available for investment purposes through the banking system. Studies, such as those of Greene and Villanueva (1991), and Beaudry, Caglayan and Schiantarelli (2001) found that private investment has a negative relationship with inflation, while Acosta and Loza (2005), and Haroon and Nasr (2011) found that the impact of inflation on private investment is positive. In the current study, inflation is expected to be a negative determinant of private investment.

Trade openness is measued by trade as a percentage of GDP. Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product (World Bank, 2021). It is also an indicator of external shocks in the economy (Oshikoya, 1994). The use of terms of trade as the determinant of private investment was motivated by the use of this proxy by previous studies, such as those of Oshikoya (1994), Acosta and Loza (2005), and Hamuda, Šuliková, Gazda & Horvath (2013). According to Oshikoya (1994), the adverse movement in the terms of trade will lead to an increase in the cost of imports relative to income, and it will also reduce the purchasing power of exports. However, the easing of trade policies, such as reducing or eliminating tariffs by government, can boost investment, as it will be easier to import and export goods and services and to trade between countries. There are studies, such as those of Naa-Idar *et al*. (2012), and Ajide and Lawanson (2012) that have found that trade openness has a positive impact on private investment, while Ouattara (2005) found that the terms of trade have a negative effect on private investment. Therefore, trade openness is expected to be either a negative or a positive determinant of private investment.

6.2.2 Model 2: The crowding effect of public investment on private investment – ARDL and NARDL approach

The formulation of the model to examine whether public investment crowds in or out private investment follows the work of Blejer and Khan (1984), Odedokun (1997), and Makuyana and Odhiambo (2019). Oshikoya (1994) found that public infrastructure has a positive impact on private investment, while non-infrastructure investment has a negative influence on private investment. Therefore, public investment has been disaggregated into infrastructure and non-infrastructure public investment for the purposes of the current study.

Consistent with previous studies such as Odedokun (1997) and Makuyana and Odhiambo (2019), the data on infrastructure and non-infrastructure public investment was obtained by gross public investment decomposed into infrastructure and non-infrastructure public investment for all the three countries. These proxies of infrastructure and non-infrastructure public investment are based on the assumption that infrastructural investment is an ongoing process that is associated with economic development and has a long gestation period (Blejer and Khan, 1984). Therefore, the infrastructure public investment is obtained following Blejer and Khan (1984) as follows:

$$PubInfr = PubI_0 e^{gt} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \ldots \ldots \ldots \ldots 6.13$$

Where:

$PubInfr$ - the infrastructure public investment;

$PubI_0$ - the initial value of gross public investment;

e - exponent;

g- the annual growth rate of public investment; and

t- time period in years;

Non-infrastructure public investment ($PubNonInfr$) is calculated by deducting infrastructure public investment ($PubInfr$) from aggregate public investment. The study is aware that there are limitations in generating infrastructural and non-infrastructural public investment using the Blejer & Khan (1984) method, however other empirical studies such as Odedokun (1997) and Makuyana & Odhiambo (2019)

suggest that if data is not available, this seems as the most feasible alternative to obtain the data.

In some cases, the relationship among the economic variables might not be linear, which means that there could be an asymmetric or nonlinear relationship among the variables. The linear ARDL model, introduced by Pesaran *et al.* (2001) with two variables Y_t and X_t is expressed as follows:

$$\Delta y_t = \alpha_0 + \rho y_{t-1} + \theta x_{t-1} + \sum_{J=1}^{p-1} \partial_j \Delta y_{t-j} + \sum_{J=0}^{q-1} \sigma_j \Delta x_{t-j} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.14$$

Where Δ is the first difference operator. α, ρ, θ, ∂ and σ are coefficients that will be estimated. p and q are the optimal lag order to be selected.

To account for the asymmetric, the Non-linear Autoregressive Distributive Lag (NARDL) approach used by Shin, Yu and Greenwood-Nimmo (2014), which is an advanced version of the ARDL that decomposed X_t into its positive and negative partial sums as:

$$X_t = \alpha_0 + X_t^+ + X_t^- \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.15$$

Where

$$X_t^+ = \sum_{J=1}^{t} \Delta X_t^+ = \sum_{j=1}^{t} \max(\Delta X_j; 0)$$

$$X_t^- = \sum_{J=1}^{t} \Delta X_t^- = \sum_{j=1}^{t} \min(\Delta X_j; 0)$$

Hence, the long-run asymmetric relationship can be written as follows:

$$Y_t = \alpha_0 + \beta^+ X_t^+ + \beta^- X_t^- + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.16$$

Where, β^+ and β^- are the long-run asymmetric parameters associated with the positive and negative changes in X_t, respectively. To obtain the NARDL model, Shin *et al.* (2014) combined equation 6.16 with equation 6.14, and it is expressed as follows:

$$\Delta y_t = \partial_0 + \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{J=1}^{p-1} \partial_j \Delta y_{t-j}$$
$$+ \sum_{J=0}^{q-1} (\sigma_j^+ \Delta x_{t-j}^+ + \sigma_j^- \Delta x_{t-j}^-) + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 6.17$$

The analysis of the NARDL consists of four steps. Fousekis *et al*. (2016:500) listed the steps as follows, firstly, estimate the NARDL model by the standard OLS. The second step is to examine if there is an asymmetric cointegrating relationship between y_t, x_t^+, x_t^-. The third step is to test for long- and short-run symmetry. The null hypothesis for the long-run symmetry is given by $-\theta^+/\rho = -\theta^-/\rho$, and for the short-run, it is given by $-\sigma_j^+/\partial_j = -\sigma_j^-/\partial_j$. Both are tested using the Wald test. In the last step, if it is found that there is asymmetry, either in the long-run, short-run or both, there will be a derivation of the positive and negative dynamic multipliers associated with unit changes in x_t^+ and x_t^-. They are calculated as follows:

$$\mathrm{m}_\mathrm{h}^+ = \sum_{\mathrm{j}=0}^{\mathrm{h}} \frac{\partial \mathrm{y}_{\mathrm{t+j}}}{\partial \mathrm{x}_\mathrm{t}^+}, h = 1,2,3 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . . 6.18$$

$$\mathrm{m}_\mathrm{h}^- = \sum_{\mathrm{j}=0}^{\mathrm{h}} \frac{\partial \mathrm{y}_{\mathrm{t+j}}}{\partial \mathrm{x}_\mathrm{t}^-},, h = 1,2,3 \dots . . \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . . 6.19$$

When, $\mathrm{h} \to \infty$ then $\mathrm{m}_\mathrm{h}^+ \to \beta^+$ and $\mathrm{m}_\mathrm{h}^- \to \beta^-$.

Therefore, the NARDL approach by Shin *et al.* (2014) was used to analyse both long- and short-run asymmetric relationship between aggregate public investment and private investment. Following the work of Akber *et al.* (2020), the NARDL was adopted for the current study to explore the impact of aggregate public investment on private investment in South Africa, Botswana and Malawi.

The NARDL model aims to capture both short- and long-run asymmetries in the variables included in the study, while reserving all merits of the standard ARDL approach (Cheah, Yiew & Ng, 2017). In this model, public investment was decomposed into negative and positive partial sums. The positive partial sum series

capture the increase of public investment, while the negative partial sum series reflect the decrease of public investment (Pal & Mitra, 2016).

The study uses three models to examine the crowding in or out effect of public investment on private investment. The first model examines the impact of aggregate public investment on private investment using both ARDL and NARDL approaches. The second model examine the effect of infrastructure public investment on private investment using the ARDL technique; and the third model examine the impact of non-infrastructure public investment on private investment also using ARDL approach. Other variables that have an influence on private investment such as economic growth, domestic credit to private sector, inflation rate, real interest rate and trade openness are included in the model. The empirical models to examine the impact of public investment on private investment are specified as follows:

Model 2a: Aggregate Public Investment and Private Investment

ARDL:

$$PrvI_t = \alpha_0 + \beta_1 PubI_t + \beta_2 Y_t + \beta_3 Cred_t + \beta_4 Int_t + \beta_5 Inf_t + \beta_6 TO_t + \mu_{1t} \dots\dots\dots\dots 6.20$$

NARDL:

$$PrvI_t = \alpha_0 + \beta_1^+ PubI_t^+ + \beta_2^- PubI_t^- + \beta_3 Y_t + \beta_4 Cred_t + \beta_5 Int_t + \beta_6 Inf_t + \beta_7 TO_t + \mu_{1t} \dots\dots\dots\dots 6.21$$

Model 2b: Infrastructure Public Investment and Private Investment

ARDL:

$$PrvI_t = \alpha_0 + \beta_1 PubInfr_t + \beta_2 Y_t + \beta_3 Cred_t + \beta_4 Int_t + \beta_5 Inf_t + \beta_6 TO_t + \mu_{1t} \dots\dots 6.22$$

Model 2c: Non-Infrastructure Public Investment and Private Investment

ARDL:

$$PrvI_t = \alpha_0 + \beta_1 PubNonInfr_t + \beta_2 Y_t + \beta_3 Cred_t + \beta_4 Int_t + \beta_5 Inf_t + \beta_6 TO_t + \mu_{1t} .. 6.23$$

Where: $PrvI$ - private investment; Y - economic growth; $PubI$ – aggregate public investment; $PubInfr$ – infrastructure public investment; $PubNonInfr$ - non-infrastructure public investment; $Cred$ – domestic credit to private sector; Int - real interest rate; Inf - inflation; TO - trade openness.

6.2.3 Model 3: Multivariate Granger-causality between domestic private investment and its determinants

The Granger-causality test determines whether one time series is useful in forecasting another (Granger, 1969). The ECM-based Granger-causality model was used to determine the causal relationship between private investment and its determinants. Considering the limitations of the bivariate causality framework, this study used the multivariate Granger-causality model. This is because it is now well known that the bivariate model may suffer from the omission variable bias in the causality model and could lead to erroneous causal inferences (Luintel & Khan, 1999). The multivariate causality model consists of private investment, economic growth, public investment, inflation, domestic credit to private sector, real interest rate and trade openness. The specific variables were chosen because the literature has established that they have a link with private investment (Erenburg & Wohar, 1995; Hyder, 2001; Tan & Tang, 2012).

6.3 ESTIMATION TECHNIQUES AND DATA SOURCES

6.3.1 Unit Root Tests

The first step of the ARDL approach to cointegration testing is to determine if there are any variables that are integrated of order two or higher. For this purpose, the study utilised the Augmented Dickey-Fuller (ADF), Dickey-Fuller Generalised Least Square (DF-GLS) and the Phillips-Perron (PP) unit root tests. The study also used the unit roots test with structural breaks, namely, the Zivot-Andrews (1992).

To conduct the ADF test, the lagged values of the dependent variable ΔY_t are added to eliminate the autocorrelation in the model (Asteriou & Hall, 2011). According to Gujarati (2003:817), the ADF test is estimated as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha \Delta Y_{t-i} + \varepsilon_t \quad \ldots\ldots 6.24$$

The DF-GLS test was proposed by Elliot, Rothenberg and Stock (1996). According to Enders and Liu (2014), the DF-GLS test detrends or demeans the data as follows:

$$y_t^d = y_t - \beta' z_t \quad \ldots\ldots 6.25$$

Where $z_t = (1, t)$ is used for detrending, and $z_t = (1)$ is for demeaning. Enders and Liu (2014) stated that the y_t^d series is estimated using the ADF equation without any deterministic regressors as follows:

$$\Delta y_t^d = \rho y_{t-1}^d + \sum_{i=1}^{k} \delta_i \Delta y_{t-i}^d + \varepsilon_t \quad \ldots\ldots 6.26$$

Where Δ is the difference operator, y_t^d is the generalised least squares de-trended value of the variable, and ε_t is the error term. Although the ADF and DF-GLS are the mostly used, the DF-GLS provides better performance in terms of small sample size and power than the ADF (Enders & Liu, 2014).

The PP test was developed by Phillips and Perron (1988). The equation for the PP test, according to Asteriou and Hall (2011) is the Autoregressive (AR (1) process:

$$\Delta y_{t-1} = \alpha_0 + \gamma y_{t-1} + \varepsilon_t \quad \ldots\ldots 6.27$$

The DF-GLS and the PP test are commonly used unit root tests, however, they do not account for structural breaks. There are numerous tests that can be used for unit root tests in the presence of structural breaks, such as that of Zivot-Andrews (1992) and Perron (1997).

The Zivot-Andrews (1992) unit root test is used to determine if the data might have issues of structural breaks. According to Shrestha and Chowdhury (2005), the three models of Zivot and Andrews (1992) are as follows:

Model 1 with intercept:

$$y_t = \hat{\mu}^A + \hat{\theta}^A DU_t(\hat{\lambda}) + \hat{\beta}^A{}_t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{c}^A{}_j \Delta y_{t-j} + \hat{e}_t \quad \ldots\ldots 6.28$$

Model 2 with trend:

$$y_t = \hat{\mu}^B + \hat{\beta}^B{}_t + \hat{\gamma}^B DT_t^*(\hat{\lambda}) + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{c}^B{}_j \Delta y_{t-j} + \hat{e}_t \quad \ldots\ldots 6.29$$

Model 3 with both the intercept and trend:

$$y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{\lambda}) + \hat{\beta}^C{}_t + \hat{\gamma}^C DT_t^*(\hat{\lambda}) + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{c}^C{}_j \Delta y_{t-j} + \hat{e}_t \ldots\ldots\ldots\ldots\ldots\ldots 6.30$$

Where,

$DU_t(\lambda) = 1$ if $t > T\lambda$, 0 otherwise;

$DT_t^*(\lambda) = t - T\lambda$ if $t > T\lambda$, 0 otherwise.

The first model allows for a break in the intercept, model 2 allows for a break in the slope, while model 3 allows for a break in both the intercept and the slope (Glynn, Perera & Verma, 2007). The null hypothesis under the three models is that the series has a unit root with a break, while the alternative hypothesis is that the series is a broken trend stationary process (Glynn *et al.,* 2007).

6.3.2 Cointegration Test: ARDL Bounds Testing Approach

6.3.2.1 Cointegration Test – Model 1

After the variables have been tested for stationarity, the next step would be to test whether there is cointegration among the variables. There are many techniques to test for cointegration, such as the Engle-Granger (1987) approach and the Johansen-Juselius (1990) approach. However, these methods have a low testing power, among other problems (Shrestha & Chowdhury, 2007).

The current study uses the ARDL model developed by Pesaran *et al.* (2001) to examine the determinants of domestic private investment in South Africa, Botswana and Malawi. This approach is selected, since it offered some empirical advantages over the other techniques that can be used to determine cointegration. The key advantages are that the variables do not need to be integrated in the same order, therefore, variables that are I(0) and I(1) can be included in the model. It has also been found to be efficient, even when the sample is small (Tang, 2004).

Following Pesaran *et al.* (2001), the ARDL representation of Model 1 is specified as follows:

Model 1: The Determinants of Domestic Private Investment

ARDL:

$$\Delta PrvI = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta PubI_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \beta_1 PrvI_{t-1} + \beta_2 Y_{t-1} + \beta_3 PubI_{t-1} + \beta_4 Cred_{t-1} + \beta_5 Int_{t-1} + \beta_6 Inf_{t-1} + \beta_7 TO_{t-1} + \mu_{1t} \ldots\ldots 6.31$$

Where:

$PrvI$ - private investment; Y - economic growth; $PubI$ – aggregate public investment; $Cred$ - credit to private sector; Int - real interest rate; Inf - inflation; TO - trade openness; μ_{1t} - error term; α_0 - constant term; α and β - the respective coefficients; Δ - difference operator; n - lag length.

The first stage of the ARDL procedure involves testing for cointegration on the specified equations. The null and alternative hypothesis to test for cointegration is expressed as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$

H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$

The computed F-statistic is used to determine the cointegration. According to Pesaran *et al.* (2001), if the computed F- statistic is above the value of the upper critical bounds, then the null hypothesis is to be rejected. If the F-statistic is below the values of the lower bounds, then the null hypothesis of no cointegration is accepted.

Error Correction Model – Model 1

After testing for cointegration, the next step of the ARDL procedure estimate the coefficients of the long-run relationships. The lag length selection is conducted using the Schwartz-Bayesian Criterion (SBC) or the Akaike Information Criterion (AIC). The SBC uses the smallest possible lag length, and is therefore, described as the parsimonious model, while the AIC chooses the maximum relevant lag length (Kargbo & Adamu, 2009). The error correction representation of the model used in this study can be expressed as follows:

Model 1: The determinants of Domestic Private Investment

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubI_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \theta_1 ECM_{t-1} + \mu_t \ldots 6.32$$

6.3.2.2 Cointegration Test – Model 2

The NARDL approach developed by Shin *et al.* (2014) uses negative and positive changes, and also captures the asymmetries in the short-run, as well as the long-run relationship (Akber *et al.,* 2020). The equation for the asymmetric cointegration model is stated as follows:

$$PrvI_t = \alpha_0 + \beta_1^+ PubI_t^+ + \beta_2^- PubI_t^- + \beta_3 Y_t + \beta_3 Cred_t + \beta_4 Int_t + \beta_6 Inf_t + \beta_7 TO_t + \mu_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.33$$

Where: $PInv$ - private investment; Y - economic growth; $PubI$ – aggregate public investment; $Cred$ - credit to private sector; Int - real interest rate; Inf - inflation; TO - trade openness; μ_{1t} - error term; α_0 - constant term; α and β - the respective coefficients.

The full version of the NARDL model from equation 6.33 is expressed as follows:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i}^+ \Delta PubI_{t-i}^+ + \sum_{i=0}^{n} \alpha_{3i}^- \Delta PubI_{t-i}^- + \sum_{i=0}^{n} \alpha_{4i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{8i} \Delta TO_{t-i} + \beta_1 PrvI_{t-1} + \beta_2^+ PubI_{t-1}^+ + \beta_3^- PubI_{t-1}^- + \beta_4 Y_{t-1} + \beta_5 Cred_{t-1} + \beta_6 Int_{t-1} + \beta_7 Inf_{t-1} + \beta_8 TO_{t-1} + \mu_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.34$$

The objective is to examine whether public investment has symmetric or asymmetric effect on private investment. Therefore, to capture the asymmetric effects, public investment is decomposed into positive shocks ($PubI_t^+$) and negative shocks ($PubI_t^-$) as follows:

$$PubI_t^+ = \sum_{i=1}^{t} \Delta PubI_t^+ = \sum_{i=1}^{t} \max(\Delta PubI_j, 0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.35$$

$$PubI_t^- = \sum_{i=1}^{t} \Delta PubI_t^- = \sum_{i=1}^{t} \min(\Delta PubI_j, 0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.36$$

Similar to the ARDL approach, the computed F-statistic is compared to the upper and lower critical values by Pesaran *et al.* (2001) to confirm the asymmetrical cointegration in the long-run. The null and alternative hypothesis to test cointegration for model 2a is expressed as follows:

H_0: $\beta_1 = \beta_2^+ = \beta_3^- = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$

H_1: $\beta_1 \neq \beta_2^+ \neq \beta_3^- \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$

The rejection of the null hypothesis confirm the asymmetric long-run association between public investment and private investment. After, the Wald test is used to identify the asymmetry effects of public investment on private investment. The presence of long- and short-run asymmetry is confirmed by the rejection of the null hypothesis. The null and alternative hypothesis to test presence of long-run asymmetry is expressed as follows:

H_0: $-\beta_2^+/\beta_1 = -\beta_3^-/\beta_1$

H_1: $-\beta_2^+/\beta_1 \neq -\beta_3^-/\beta_1$

The null and alternative hypothesis to test the presence of short-run asymmetry is expressed as follows:

H_0: $-\alpha_{2i}^+/\alpha_{1i} = -\alpha_{3i}^-/\alpha_{1i}$

H_1: $-\alpha_{2i}^+/\alpha_{1i} \neq -\alpha_{3i}^-/\alpha_{1i}$

Lastly, the asymmetric cumulative dynamic multiplier effect as a one percent change in $PubI_t^+$ and $PubI_t^-$ is checked as follows:

$$m_h^+ = \sum_{j=0}^{h} \frac{\partial Prvi_{t+j}}{\partial PubI_t^+}, \qquad m_h^- = \sum_{j=0}^{h} \frac{\partial PrvI_{t+j}}{\partial PubI_t^-}, \qquad h = 1,2,3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.37$$

When, $h \to \infty$ then $m_h^+ \to \beta_2^+$ and $m_h^- \to \beta_3^-$.

The ARDL model specification for Model 2 are expressed as follows:

Model 2a: Private Investment and Aggregate Public Investment

ARDL:

$$\Delta PrvI = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} PubI_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \beta_1 PrvI_{t-1} + \beta_2 PubI_{t-1} + \beta_3 Y_{t-1} + \beta_4 Cred_{t-1} + \beta_5 Int_{t-1} + \beta_6 Inf_{t-1} + \beta_7 TO_{t-1} + \mu_{1t} \quad \ldots\ldots 6.38$$

Model 2b: Infrastructure Public Investment and Private Investment

ARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubInfr_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \beta_1 PrvI_{t-1} + \beta_2 PubInfr_{t-1} + \beta_3 Y_{t-1} + \beta_4 Cred_{t-1} + \beta_5 Int_{t-1} + \beta_6 Inf_{t-1} + \beta_7 TO_{t-1} + \mu_{1t} \quad \ldots\ldots 6.39$$

Model 2c: Non-Infrastructure Public Investment and Private Investment

ARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubNonInfr_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \beta_1 PrvI_{t-1} + \beta_2 PubNonInfr_{t-1} + \beta_3 Y_{t-1} + \beta_4 Cred_{t-1} + \beta_5 Int_{t-1} + \beta_6 Inf_{t-1} + \beta_7 TO_{t-1} + \mu_{1t} \quad \ldots\ldots 6.40$$

Where: $PInv$ - private investment; Y - economic growth; $PubInvInfr$ - infrastructure public investment; $PubInvNonInfr$ - the non-infrastructure public investment; $Cred$ - credit to private sector; Int - real interest rate; Inf - inflation; TO - trade openness; μ_{1t} - error term; α_0 - constant term; α and β - the respective coefficients; Δ - difference operator; n - lag length.

Error Correction Model – Model 2

After testing for cointegration, the next step of the ARDL procedure estimate the coefficients of the long-run relationships. The error correction representation of the models used in this study can be expressed as follows:

Model 2a: Aggregate Public Investment and Private Investment

ARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubI_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \theta_1 ECM_{t-1} + \mu_t \ldots 6.41$$

NARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i}^{+} \Delta PubI^{+}{}_{t-i} + \sum_{i=0}^{n} \alpha_{3i}^{-} \Delta PubI^{-}{}_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{8i} \Delta TO_{t-i} + \theta_1 ECM_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.42$$

Model 2b: Infrastructure Public Investment and Private Investment

ARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubInfr_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \theta_1 ECM_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.43$$

Model 2c: Non-Infrastructure Public Investment Private Investment

ARDL:

$$\Delta PrvI_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta PubNonInfr_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta TO_{t-i} + \theta_1 ECM_{t-1} + \mu_t \quad \ldots\ldots 6.44$$

Where: α_0 - the constant term; $\alpha_1 - \alpha_7$ - short-run coefficients; Δ - the difference operator; n - the lag length; θ_1 - the speed of adjustment; ECM_{t-1}- the error-correction term lagged once and μ_{1t}- the error term. The ECM coefficient is expected to be negative and statistically significant to further confirm that a cointegration relationship exists.

6.3.2.3 Cointegration Test - Model 3

The multivariate Granger-causality model within an ARDL-bounds testing approach was used to determine the causal relationship between domestic private investment and its determinants. The ARDL model for cointegration is done by taking each variable, in turn, as a dependent variable. The cointegration equations are expressed as follows:

$$\Delta PrvI_t = a_0 + \sum_{i=1}^{n} a_{1i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} a_{2i} \Delta Y_{t-i} + \sum_{i=0}^{n} a_{3i} \Delta PubI_{t-i} + \sum_{i=0}^{n} a_{4i} Cred_{t-i} + \sum_{i=0}^{n} a_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} a_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} a_{7i} \Delta TO_{t-i} + a_1 PrvI_{t-1} + a_2 Y_{t-1} + a_3 PubInv_{t-1} + a_4 Cred_{t-1} + a_5 Int_{t-1} + a_6 Inf_{t-1} + a_7 TO_{t-1} + \mu_{1t} \quad \ldots\ldots 6.45$$

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i} \Delta Y_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta PrvI_{t-i} + \sum_{i=0}^{n} \gamma_{3i} \Delta PubI_{t-i} + \sum_{i=0}^{n} \gamma_{4i} \Delta Cred_{t-i} + \sum_{i=0}^{n} \gamma_{5i} \Delta Int_{t-i} + \sum_{i=0}^{n} \gamma_{6i} \Delta Inf_{t-i} + \sum_{i=0}^{n} \gamma_{7i} \Delta TO_{t-i} + \gamma_1 Y_{t-1} + \gamma_2 PrvI_{t-1} + \gamma_3 PubI_{t-1} + \gamma_4 Cred_{t-1} + \gamma_5 Int_{t-1} + \gamma_6 Inf_{t-1} + \gamma_7 TO_{t-1} + \mu_{2t} \quad \ldots 6.46$$

$$\Delta PubI_t = \psi_0 + \sum_{i=1}^{n} \psi_{1i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \psi_{2i}\,Y_{t-i} + \sum_{i=0}^{n} \psi_{3i}\,PrvI_{t-i} + \sum_{i=0}^{n} \psi_{4i}\,\Delta Cred_{t-i}$$
$$+ \sum_{i=0}^{n} \psi_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \psi_{6i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \psi_{7i}\,\Delta TO_{t-i} + \psi_1 InPubI_{t-1}$$
$$+ \psi_2 Y_{t-1} + \psi_3 PrvI_{t-1} + \psi_4 Cred_{t-1} + \psi_5 Int_{t-1} + \psi_6 Inf_{t-1} + \psi_7 TO_{t-1}$$
$$+ \mu_{3t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.47$$

$$\Delta Cred_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\,\Delta Cred_{t-i} + \sum_{i=0}^{n} \delta_{2i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} \delta_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \delta_{4i}\,\Delta PrvI_{t-i}$$
$$+ \sum_{i=0}^{n} \delta_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \delta_{6i}\,\Delta\, Inf_{t-i} + \sum_{i=0}^{n} \delta_{7i}\,\Delta TO_{t-i} + \delta_1 Cred_{t-1} + \delta_2 Y_{t-1}$$
$$+ \delta_3 PubI_{t-1} + \delta_4 PrvI_{t-1} + \delta_5 Int_{t-1} + \delta_6 Inf_{t-1} + \delta_7 TO_{t-1} + \mu_{4t} \ldots.6.48$$

$$\Delta Int_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \varphi_{2i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \varphi_{4i}\,\Delta Cred_{t-i}$$
$$+ \sum_{i=0}^{n} \varphi_{5i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \varphi_{6i}\,\Delta PrvI_{t-i} + \sum_{i=0}^{n} \varphi_{7i}\,\Delta TO_{t-i} + \varphi_1 Int_{t-1}$$
$$+ \varphi_2 Y_{t-1} + \varphi_3 PubI_{t-1} + \varphi_4 Cred_{t-1} + \varphi_5 Inf_{t-1} + \varphi_6 PrvI_{t-1}$$
$$+ \varphi_7 TO_{t-1} + \mu_{5t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.49$$

$$\Delta Inf_t = \omega_0 + \sum_{i=1}^{n} \omega_{1i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \omega_{2i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} \omega_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \omega_{4i}\,\Delta Cred_{t-i}$$
$$+ \sum_{i=0}^{n} \omega_{5i}\,\Delta PrvI_{t-i} + \sum_{i=0}^{n} \omega_{6i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \omega_{7i}\,\Delta TO_{t-i} + \omega_1 Inf_{t-1}$$
$$+ \omega_2 Y_{t-1} + \omega_3 PubI_{t-1} + \omega_4 Cred_{t-1} + \omega_5 PrvI_{t-1} + \omega_6 Int_{t-1}$$
$$+ \omega_7 TO_{t-1} + \mu_{6t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.50$$

$$\Delta TO_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\,\Delta TO_{t-i} + \sum_{i=0}^{n} \phi_{2i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} \phi_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \phi_{4i}\,\Delta Cred_{t-i}$$
$$+ \sum_{i=0}^{n} \phi_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \phi_{6i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \phi_{7i}\,\Delta PrvI_{t-i} + \phi_1 TO_{t-1}$$
$$+ \phi_2 Y_{t-1} + \phi_3 PubI_{t-1} + \phi_4 Cred_{t-1} + \phi_5 Int_{t-1} + \phi_6 Inf_{t-1} + \phi_7 PrvI_{t-1}$$
$$+ \mu_{7t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6.51$$

Where: $PInv$ - private investment; Y - economic growth; $PubInv$ - public investment; $Cred$ - credit to private sector; Int - real interest rate; Inf - inflation; TO - trade openness; μ_{1t}, $\ldots..\mu_{9t}$ - error term; $a_0, \gamma_0, \psi_0, \delta_{0,} \varphi_0, \omega_0, \phi_0,$ - constants; $a_1 \ldots a_9, \gamma_1 \ldots \gamma_9, \psi_1 \ldots \psi_9, \delta_1 \ldots \delta_{9,}\ \varphi_1 \ldots \varphi_9,\ \omega_1 \ldots \omega_9, \phi_1 \ldots \phi_9$ - coefficients.

6.3.3 Multivariate Granger-Causality Test

The study tests for cointegration among the variables in the causality models before Granger-causality could be estimated. After confirmation of cointegration between private investment and its determinants, the causal relationship is investigated using the multivariate Granger-causality model based on an ECM framework. The following functions are estimated for each country as follows:

Model 3: Causality between Domestic Private Investment and its Determinants

$$\Delta PrvI_t = a_0 + \sum_{i=1}^{n} a_{1i}\,\Delta PrvI_{t-i} + \sum_{i=0}^{n} a_{2i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} a_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} a_{4i}\,Cred_{t-i} + \sum_{i=0}^{n} a_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} a_{6i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} a_{7i}\,\Delta TO_{t-i} + a_8 ECM_{t-1} + \mu_{1t} \quad \ldots\ldots\ldots\ldots 6.52$$

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i}\,\Delta Y_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\,\Delta PrvI_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\,\Delta Cred_{t-i} + \sum_{i=0}^{n} \gamma_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \gamma_{7i}\,\Delta TO_{t-i} + \gamma_8 ECM_{t-1} + \mu_{2t} \quad \ldots\ldots\ldots\ldots 6.53$$

$$\Delta PubI_t = \psi_0 + \sum_{i=1}^{n} \psi_{1i}\,\Delta PubI_{t-i} + \sum_{i=0}^{n} \psi_{2i}\,Y_{t-i} + \sum_{i=0}^{n} \psi_{3i}\,PrvI_{t-i} + \sum_{i=0}^{n} \psi_{4i}\,\Delta Cred_{t-i} + \sum_{i=0}^{n} \psi_{5i}\,\Delta Int_{t-i} + \sum_{i=0}^{n} \psi_{6i}\,\Delta Inf_{t-i} + \sum_{i=0}^{n} \psi_{7i}\,\Delta TO_{t-i} + \sum_{i=0}^{n} \psi_{8i}\,\Delta FDI_{t-i} + \psi_9 ECM_{t-1} + \mu_{3t} \quad \ldots\ldots\ldots\ldots 6.54$$

$$\Delta Cred_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i}\, \Delta Cred_{t-i} + \sum_{i=0}^{n} \delta_{2i}\, \Delta Y_{t-i} + \sum_{i=0}^{n} \delta_{3i}\, \Delta PubI_{t-i} + \sum_{i=0}^{n} \delta_{4i}\, \Delta PrvI_{t-i} + \sum_{i=0}^{n} \delta_{5i}\, \Delta Int_{t-i} + \sum_{i=0}^{n} \delta_{6i}\, \Delta Inf_{t-i} + \sum_{i=0}^{n} \delta_{7i}\, \Delta TO_{t-i} + \delta_8 ECM_{t-1} + \mu_{4t} \quad \ldots\ldots 6.55$$

$$\Delta Int_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\, \Delta Int_{t-i} + \sum_{i=0}^{n} \varphi_{2i}\, \Delta Y_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\, \Delta PubI_{t-i} + \sum_{i=0}^{n} \varphi_{4i}\, \Delta Cred_{t-i} + \sum_{i=0}^{n} \varphi_{5i}\, \Delta PrvI_{t-i} + \sum_{i=0}^{n} \varphi_{6i}\, \Delta Inf_{t-i} + \sum_{i=0}^{n} \varphi_{7i}\, \Delta TO_{t-i} + \varphi_8 ECM_{t-1} + \mu_{5t} \quad \ldots\ldots 6.56$$

$$\Delta Inf_t = \omega_0 + \sum_{i=1}^{n} \omega_{1i}\, \Delta Inf_{t-i} + \sum_{i=0}^{n} \omega_{2i}\, \Delta Y_{t-i} + \sum_{i=0}^{n} \omega_{3i}\, \Delta PubI_{t-i} + \sum_{i=0}^{n} \omega_{4i}\, \Delta Cred_{t-i} + \sum_{i=0}^{n} \omega_{5i}\, \Delta Int_{t-i} + \sum_{i=0}^{n} \omega_{6i}\, \Delta PrvI_{t-i} + \sum_{i=0}^{n} \omega_{7i}\, \Delta TO_{t-i} + \omega_8 ECM_{t-1} + \mu_{6t} \quad \ldots\ldots 6.57$$

$$\Delta TO_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\, \Delta TO_{t-i} + \sum_{i=0}^{n} \phi_{2i}\, \Delta Y_{t-i} + \sum_{i=0}^{n} \phi_{3i}\, \Delta PubI_{t-i} + \sum_{i=0}^{n} \phi_{4i}\, \Delta Cred_{t-i} + \sum_{i=0}^{n} \phi_{5i}\, \Delta Int_{t-i} + \sum_{i=0}^{n} \phi_{6i}\, \Delta Inf_{t-i} + \sum_{i=0}^{n} \phi_{7i}\, \Delta PrvI_{t-i} + \phi_8 ECM_{t-1} + \mu_{7t} \quad \ldots\ldots 6.58$$

Equations 6.52 to 6.58 investigate the short- and long-run Granger-causality, and are run on all the three countries. The joint F-test statistic is used to determine the direction of causality in the short-run, while the significance of the t-test statistic for the ECM, which must be negative for each of the multivariate functions, determines the long-run causality (Sbia, Muhammad & Ozturk, 2017).

6.3.4 Data sources

The study considered time-series annual data for analyses. The data covers the period from 1980 to 2018. The data for all the variables included in the study is obtained from the World Development Indicators (WDI). Data for the credit to the private sector for

Malawi in 2017 and 2018 was calculated from the annual economic report (Malawi Ministry of Finance, Economic Planning and Development, 2019). Table 6.1 presents the summary of the measurement of the variables used in the study.

Table 6.1: Summary of variables used in the study

Notation	Variable description
PrvI	Private sector gross fixed capital formation as a percentage of GDP
Y	Real GDP per capita
PubI	Public sector gross fixed capital formation as percentage of GDP
Cred	Domestic credit to private sector as a percentage of GDP
Int	Lending rate adjusted for inflation
Inf	Consumer price index
TO	Trade as a percentage of GDP

6.4 CONCLUSION

This chapter has discussed the specification of the empirical model that is utilised in the study, and the estimation techniques that are to be employed in estimating the determinants of domestic private investment, the crowding effects of public investment on private investment as well as the causality between private investment and its determinants in South Africa, Botswana and Malawi. The chapter has also discussed the data sources of the variables used in the study.

CHAPTER 7

ECONOMETRIC ANALYSIS AND EMPIRICAL FINDINGS

7.1 INTRODUCTION

This chapter presents and discusses the econometric analysis and empirical findings from the study for South Africa, Botswana and Malawi, using the methodology and estimation techniques that were discussed in Chapter 6. The study uses the ARDL approach to study the determinants of domestic private investment as well as the crowding effects of infrastructure and non-infrastructure public investment on private investment. The NARDL approach is used to examine the nonlinear impact of public investment on private investment, and the ECM-based Granger-causality model is used to determine the causal relationship between private investment and its determinants.

The study utilised three models to achieve its objectives. Model 1 uses the ARDL approach to examine the macroeconomic determinants of domestic private investment. Model 2 is sub-divided into three models that examines whether public investment crowds in or out private investment. Using the ARDL and NARDL, Model 2a examine the crowding in or out effect of aggregate public investment, while Model 2b and 2c investigate the crowding in or out of infrastructure and non-infrastructure public investment on private investment using the ARDL. Model 3 examine the causality between private investment and the selected determinants, which are public investment, economic growth, credit to the private sector, inflation, interest rate and trade openness, using the multivariate Granger-causality model based on an ECM framework.

The chapter is presented as follows: Section 7.2 presents the descriptive statistics for all the variables and Section 7.3 presents the unit root tests results for all the variables included in Model 1 to 3. Section 7.4 presents the econometric analysis and empirical findings of the determinants of domestic private investment, the crowding in or out of public investment on private investment, and the multivariate Granger-causality model for all the countries in the study. Section 7.5 presents the summary of the results for

the three models in South Africa, Botswana and Malawi, and lastly, Section 7.6 presents the conclusion.

7.2 DESCRIPTIVE STATISTICS

The study used annual data from 1980 to 2018. The variables used are PrvI (Private investment); Y (GDP per capita); PubI (public investment); Cred (domestic credit to the private sector); Int (real interest rate); Inf (inflation rate); and TO (trade openness). The descriptive statistics which includes the mean, median, maximum and minimum values, kurtosis, skewness and Jarque-Bera test for the data used in the study were conducted for all the three study countries.

Table 7.1 presents the descriptive statistics for private investment and the macroeconomic determinants of domestic private investment in South Africa, Botswana and Malawi.

Table 7.1: Descriptive statistics results of all variables

	South Africa						
	Prvl	**Y**	**Publ**	**Cred**	**Int**	**Inf**	**TO**
Mean	15.807	6547.320	4.174	108.930	4.200	8.890	52.802
Median	15.603	6426.357	3.161	116.360	4.024	7.309	51.975
Maximum	20.761	7582.948	8.454	160.125	12.993	18.655	72.865
Minimum	12.470	5517.529	2.471	53.967	-12.315	-0.692	37.487
Std. Dev.	2.361	702.669	1.919	31.464	4.284	4.590	8.035
Skewness	0.521	0.129	1.115	-0.480	-1.171	0.345	0.092
Kurtosis	2.350	1.580	2.707	1.847	7.508	2.259	2.542
Jarque-Bera	2.392	3.299	8.007	3.563	40.854	1.620	0.385
Probability	0.302	0.192	0.018	0.168	0.000	0.445	0.825
Sum	602.377	249493.4	157.844	4248.263	159.752	331.383	2021.217
Sum Sq. Dev.	206.225	18268535	136.203	36628.79	678.944	779.564	2388.793
Observations	39	39	39	39	39	39	39

	Botswana						
	Prvl	**Y**	**Publ**	**Cred**	**Int**	**Inf**	**TO**
Mean	18.902	5098.876	10.256	18.257	3.609	8.948	101.401
Median	17.885	5126.367	10.183	14.711	4.154	8.601	98.929
Maximum	34.516	8032.892	17.206	33.773	19.782	16.428	124.649
Minimum	12.136	2109.015	6.716	6.640	-12.114	2.815	75.602
Std. Dev.	4.994	1739.664	2.939	8.611	6.552	3.293	13.908
Skewness	0.937	0.036	-0.710	0.469	-0.046	0.169	0.216
Kurtosis	3.742	2.046	5.521	1.807	3.093	2.968	1.864
Jarque-Bera	6.600	1.486	13.608	3.742	0.028	0.188	2.400
Probability	0.037	0.476	0.001	0.154	0.986	0.910	0.301
Sum	737.160	198856.2	399.996	712.023	140.753	348.967	3954.643
Sum Sq. Dev.	947.748	1.15E+08	328.246	2817.565	1631.411	412.027	7350.737
Observations	39	39	39	39	39	39	39

	Malawi						
	Prvl	**Y**	**Publ**	**Cred**	**Int**	**Inf**	**TO**
Mean	7.073	403.737	7.872	10.241	9.507	19.459	60.082
Median	6.338	384.278	7.556	9.478	9.644	14.395	56.803
Maximum	17.288	521.353	15.144	17.723	34.954	83.326	91.378
Minimum	2.341	317.590	4.249	4.125	-29.221	7.412	41.901
Std. Dev.	3.700	61.499	2.354	3.703	11.837	14.152	10.643
Skewness	0.852	0.655	0.757	0.303	-0.921	2.572	0.902
Kurtosis	3.105	2.115	3.941	2.500	5.023	11.678	3.441
Jarque-Bera	4.611	3.954	5.036	0.976	11.859	161.120	5.466
Probability	0.100	0.138	0.081	0.614	0.003	0.000	0.065
Sum	271.117	15342.00	289.572	381.081	370.016	758.902	2279.533
Sum Sq. Dev.	506.568	139940.2	205.018	507.253	5184.603	7410.202	4191.201
Observations	39	39	39	39	39	39	39

7.3 UNIT ROOT RESULTS

The first step before starting the empirical analysis is to test for the stationary properties of private investment and its determinants in South Africa, Botswana and Malawi. The determinants are public investment, economic growth, credit to the private sector, interest rate, inflation and trade openness. This is to ensure that all the variables included in the model are not integrated of order two or higher. To test for stationarity, the study utilised the ADF, DF-GLS and PP unit root test. The study also used the Zivot-Andrews (1992) unit root test to test for stationarity in the variables. The unit root tests are carried out with intercept with no trend, and intercept with trend.

The results of the stationarity tests in levels, and at first difference for South Africa, Botswana and Malawi for all the variables are presented in Table 7.2.

Table 7.2: Stationarity test results of all variables

Augmented Dickey-Fuller (ADF)												
Variable	South Africa				Botswana				Malawi			
	Level		1st Difference		Level		1st Difference		Level		1st Difference	
	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend
$PrvI$	-2.27	-2.59	-3.99***	-4.08***	-1.84	-2.77	-3.60**	-3.64**	-2.57	-2.54	-6.08***	-6.00***
Y	-0.79	-2.73	-3.82***	-4.27***	-0.46	-2.94	-4.73***	-3.98***	-0.20	-2.28	-6.83***	-7.22***
$PubI$	-2.00	-1.08	-5.45***	-6.05***	-2.33	-2.63	-5.52***	-5.67***	-2.31	-2.16	-5.04***	-4.20**
$CRED$	-1.51	-1.21	-5.84***	-3.58*	-0.05	-3.16	-5.61***	-5.85***	-2.48	-2.28	-6.22***	-6.24***
INT	-1.35	-1.24	-4.45***	-5.12***	-2.42	-3.00	-5.22***	-4.43***	-1.98	-3.08	-4.68***	-4.76***
INF	-1.45	-1.28	-2.95**	-5.23***	-1.43	-2.65	-3.21**	-5.87***	-2.25	-2.35	-7.49***	-7.42***
TO	-1.85	-3.18	-6.09***	-6.08***	-2.59	-2.98	-5.54***	-5.45***	-2.41	-2.78	-5.69***	-5.59***
$PubInfr$	-1.95	-2.26	-7.72***	7.92***	-4.94***	-5.03***	__	__	-6.92***	-7.00***	__	__
$PubNonInfr$	-5.99***	-6.19***	__	__	-5.39***	-5.30***	__	__	-7.49***	-7.49***		

Variable	Dickey-Fuller Generalised Least Square (DF-GLS)											
	South Africa				Botswana				Malawi			
	Level		1st Difference		Level		1st Difference		Level		1st Difference	
	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend
$PrvI$	-1.07	-1.36	-2.70***	-3.93***	-1.49	-2.22	-2.60***	-4.09***	-1.12	-2.61	-6.16***	-6.18***
Y	-0.84	-1.79	-3.51***	-3.89***	-1.30	-2.67	-3.95***	-3.99***	-0.01	-1.60	-1.99**	-3.26**
$PubI$	-0.60	-1.05	-4.49***	-5.27***	-1.15	-1.85	-1.82*	-3.60**	-1.05	-2.48	-2.13**	-3.92***
$CRED$	-0.62	-1.52	-5.88***	-6.00***	-0.47	-1.74	-4.22***	-5.06***	-1.49	-1.96	-6.21***	-6.42***
INT	-0.48	-1.56	-2.76***	-4.89***	-1.57	-2.07	-3.63***	-5.10***	-1.26	-3.16*	-4.20***	-4.26***
INF	-1.40	-2.85	-5.35***	-5.59***	-1.26	-2.63	-3.94***	-5.50***	-1.522	-1.708	-7.55***	-7.62***
TO	-1.43	-2.39	-5.67***	-6.15***	-1.22	-2.01	-5.44***	-5.56***	-1.857*	-2.024	-8.77***	-9.01***
$PubInfr$	-1.30	-2.30	-1.79*	-6.44***	-4.96***	-5.15***	__	__	-6.01***	-6.85***	__	__
$PubNonInfr$	-4.68***	-6.10***	__	__	-5.43***	-5.45***	__	__	-6.99***	-7.63***	__	__

Variable	Phillips-Perron (PP)											
	South Africa				Botswana				Malawi			
	Level		1st Difference		Level		1st Difference		Level		1st Difference	
	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend	Without trend	With Trend
$PrvI$	-2.12	-1.89	-3.81***	-3.84***	-3.58**	-4.25***	__	__	-2.58	-2.56	-6.13***	-6.05***
Y	-0.60	-1.81	-3.87***	-3.35***	-0.35	-3.02	-7.38***	-7.23***	0.311	-2.26	-6.76***	-7.22***
$PubI$	-2.05	-0.99	-5.44***	-6.06***	-4.70***	-5.16***	__	__	-4.97***	-6.01***	__	__
$CRED$	-1.59	-0.70	-6.24***	-7.66***	-0.12	-2.09	-5.62***	-5.85***	-2.48	-2.28	-6.22***	-6.24***
INT	-5.45***	-5.25***	__	__	-3.95***	-3.86**	__	__	-5.34***	-6.93***	__	__
INF	-1.39	-2.85	-9.49***	-10.42***	-2.16	-3.37*	-8.91***	-8.76***	-3.45**	-3.35*	__	__
TO	-1.86	-3.12	-6.47***	-7.08***	-1.71	-2.18	-5.53***	-5.45***	-4.21***	-4.68***	__	__
$PubInfr$	-1.73	-2.26	-7.72***	-10.68***	-3.29**	-3.21*	__	__	-6.92***	-7.05***	__	__
$PubNonInfr$	-5.99***	-6.50***	__	__	-5.83***	-5.59***	__	__	-7.53***	-7.64***	__	__

	Zivot-Andrews (ZAURoot)							
	South Africa							
Variable	Level				1st Difference			
	Without trend	Time Break	With Trend	Time Break	Without trend	Time Break	With Trend	Time Break
$PrvI$	-4.33	2005	3.75	1991	-5.65***	2009	-5.34***	2009
Y	-4.04	2004	-3.23	1990	-6.17***	2009	-6.43***	2009
$PubI$	-3.29	1990	-3.82	1990	-7.10***	1996	-6.95***	1995
$CRED$	-1.79	2011	-2.34	2006	-10.47***	1992	-10.74***	1992
INT	-3.24	1994	-3.37	1994	-7.90***	2000	-9.50***	2000
INF	-3.60	1993	-3.63	2003	-6.84***	2007	-6.93***	2007
TO	-3.90	1989	-3.65	1990	-7.23***	2009	-7.06***	2009
$PubInfr$	-4.24	1990	-4.91*	1992	-8.21***	2009	-8.08***	2009
$PubNonInfr$	-4.62*	2000	-4.74	1997	-8.60***	2009	-5.26**	2009

	Zivot-Andrews (ZAURoot)							
	Botswana							
Variable	Level				1st Difference			
	Without trend	Time Break	With Trend	Time Break	Without trend	Time Break	With Trend	Time Break
$PrvI$	5.47***	1996	5.75***	1996	—	—	—	—
Y	-3.56	2000	3.61	1993	-5.59***	1993	-6.61***	1992
$PubI$	-4.60*	2011	-5.14**	2008	—	—	—	—
$CRED$	-3.80	2007	-3.38	1995	-6.43***	1989	-6.39***	1993
INT	-4.26	1991	-5.76***	1990	-6.53***	1989	-6.61***	1993
INF	-3.57	2013	-3.67	2006	-6.44***	2009	-7.45***	1994
TO	-2.78	2007	-2.89	2011	-5.85***	1994	-6.63***	2010
$PubInfr$	-5.60***	2011	-6.67***	2007	—	—	—	—
$PubNonInfr$	-5.94***	2007	-6.73***	2007	—	—	—	—

Variable	Zivot-Andrews (ZAURoot)							
	Malawi							
	Level				1st Difference			
	Without trend	Time Break	With Trend	Time Break	Without trend	Time Break	With Trend	Time Break
$PrvI$	-3.22	2005	-3.53	2005	-6.54***	2010	-6.73***	2010
Y	-3.66	2007	-3.20	2007	-7.51***	1995	-7.75***	2007
$PubI$	-6.86***	1992	6.79***	2002	—	—	—	—
$CRED$	-4.25	2009	3.94	1995	-6.60***	2011	-5.60***	2009
INT	-7.50***	1998	-8.03***	1998	—	—	—	—
INF	-3.58	2002	-3.49	2002	-8.81***	1996	-9.07***	1996
TO	-6.32***	2002	-6.52***	2002	—	—	—	—
$PubInfr$	-7.59***	1992	-7.70***	1996	—	—	—	—
$PubNonInfr$	-7.95***	2009	-8.23***	1996	—	—	—	—

Notes: ***, ** and * denotes stationarity at 1%, 5% and 10% significance levels respectively

The results show that the stationarity of the variables is different for each country, depending on whether a trend is included or not, and the stationarity test used. When using the ADF and DF-GLS tests, all the variables used in the study are integrated of order one for all the countries. When using the PP test, interest rate is integrated of order zero in all the three countries, while all the other variable are integrated of order one in South Africa.

In Botswana, private and public investment are integrated of order zero, while economic growth, credit to the private sector, inflation and trade openness are integrated of order one when using the PP test.

In Malawi, public investment, inflation and trade openness are integrated of order zero, while private investment, economic growth and credit to the private sector are integrated of order one when using the PP test. All the variables included in the model for all the study countries were found to be stationary at either I(0) or I(1), therefore, the analysis can be performed using the ARDL bounds testing approach.

The stationarity test results for the Zivot-Andrews (1992) show that the stationarity of the variables is different for each country, depending on whether a trend is included or not. However, the stationarity test concludes that all the variables are stationary.

Since the stationarity of the variables has been established, the step that follows is to conduct the cointegration test that determine if a long-run relationship exists between private investment and its determinants.

7.4 ECONOMETRIC ANALYSIS AND EMPIRICAL FINDINGS

This section presents the empirical findings of the three models that were estimated. The results of Model 1 are presented in Section 7.4.1, the findings of Model 2 are discussed in Section 7.4.2, and lastly, the results of Model 3 are presented in Section 7.4.3.

7.4.1 Model 1: The determinants of domestic private investment

7.4.1.1 Results of the ARDL Bounds Test

The ARDL model is used to examine the evidence of cointegration between private investment and its determinants. This cointegration is established by determining the F-statistic, and comparing it with the respective critical values that are found in

Pesaran *et al*. (2001) in Table CI (iii) case III at 1%, 5% and 10% level of significance. The results of the cointegration test for South Africa, Botswana and Malawi are presented in Table 7.3.

Table 7.3: Bounds F-test for cointegration results

Country	Model	F-Statistic	Cointegration status
South Africa	$F(PrvI\|Y, PubInfr, CRED, INT, INF, TO)$	6.981***	Cointegrated
Botswana	$F(PrvI\|Y, PubInfr, CRED, INT, INF, TO)$	5.423***	Cointegrated
Malawi	$F(PrvI\|Y, PubInfr, CRED, INT, INF, TO)$	4.005**	Cointegrated

Asymptotic critical values						
Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43

Notes: ** and *** denote statistical significance at 5% and 1% levels, respectively

The F-statistic is 6.981 for South Africa, 5.423 for Botswana and 4.005 for Malawi. The results indicate that the variables are cointegrated. This is shown by the F-statistic which is higher that the Pesaran *et al.* (2001:300) critical values. Therefore, the study rejects the null hypothesis of no cointegration, and concludes that there is a long-run relationship between private investment and its determinants.

After cointegration was confirmed, the study proceeded to determine the short- and long-run relationship between private investment and its possible determinants for South Africa, Botswana and Malawi.

The long- and short-run results are presented in Table 7.4.

Table 7.4: Results of long- and short-run estimation

Dependent variable is Prvl						
Panel A: Long-run results						
	South Africa		**Botswana**		**Malawi**	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
Y	0.0023***	3.063 [0.007]	0.0004	0.381 [0.706]	-0.0128	-0.413 [0.683]
$PubI$	1.9975***	4.543 [0.000]	-0.4691	-1.193 [0.245]	0.2821	-0.335 [0.741]
$CRED$	0.0691**	2.283 [0.036]	0.3215	1.677 [0.107]	-0.2018	-0.577 [0.569]
INT	-0.1242	-1.253 [0.227]	-0.2429*	-1.909 [0.069]	-0.2198*	-1.916 [0.068]
INF	-0.0277	-0.215 [0.832]	0.3086	1.045 [0.307]	-0.3752**	-2.410 [0.024]
TO	-0.1912**	-2.123 [0.049]	0.1134**	2.402 [0.025]	0.2311	1.010 [0.323]
Panel B: Short-run results						
	South Africa		**Botswana**		**Malawi**	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
C	-2.0634	-0.754 [0.461]	0.5805	0.116 [0.909]	5.3992	0.946 [0.354]
$\Delta PrvI(-1)$	0.5288***	3.956 [0.001]	0.2527*	1.867 [0.075]	0.4047***	2.711 [0.013]
$\Delta PrvI(-2)$	0.5302***	3.011 [0.008]	_	_	_	_
ΔY	0.0014***	2.922 0.010]	0.0002	0.380 [0.707]	-0.0054	-0.424 [0.675]

$\Delta PubI$	1.2825***	3.495 [0.003]	-0.8520***	-3.652 [0.001]	-0.234	-0.944 [0.355]
$\Delta PubI(-1)$	_	_	0.3188***	1.832 [0.008]	0.1144	0.527 [0.603]
$\Delta PubI(-2)$	_	_	_	_	0.4970***	3.067 [0.006]
$\Delta CRED$	-0.0019	-0.1000 [0.922]	0.6727***	3.765 [0.001]	-0.0861	0.623 [0.539]
$\Delta CRED(-1)$	-0.0943***	3.816 [0.001]	_	_	_	_
ΔINT	-0.0798	-1.380 [0.186]	0.0530	0.953 [0.350]	-0.0937*	-2.037 [0.053]
ΔINF	-0.2575***	-2.863 [0.011]	-0.0389	-0.269 [0.790]	-0.1601***	-3.175 [0.004]
$\Delta INF(-1)$	-0.1116	1.674 [0.112]	_	_	_	_
ΔTO	0.1772***	3.598 [0.002]	0.0579**	2.210 [0.037]	0.2170***	3.658 [0.001]
$\Delta TO(-1)$	0.1081**	2.231 [0.040]	_	_	_	_
$ECM(-1)$	-0.6420***	-8.131 [0.000]	-0.5102***	-6.918 [0.000]	-0.4266***	-5.946 [0.000]

Test Statistic	South Africa	Botswana	Malawi
R-Squared	0.881	0.809	0.684
Adjusted R-Squared	0.834	0.763	0.619
F-Statistic [Prob]	18.952 [0.000]	17.573 [0.000]	10.470 [0.000]
SE of Regression	0.440	1.277	1.824
DW Statistic	2.209	1.829	2.147

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively

The long-run empirical results for the determinants model (Model 1) in Table 7.4, show that in South Africa, economic growth, public investment and domestic credit to the private sector are the positive determinants of domestic private investment, as it was expected. The results imply that an increase in economic growth, domestic credit to the private sector and public investment will lead to an increase in domestic private investment. The findings are consistent with other studies that have found that economic growth (Erden & Holcombe, 2006; Karagoz, 2010; Tan & Tang, 2012), public investment (Ouattara, 2005; Bint-e-Ajaz & Ellahi, 2012), and domestic credit to the private sector (Karagoz, 2010) all have a positive influence on private investment.

However, it was found that economic growth, public investment and domestic credit to the private sector do not have statistically significant effect on private investment in Botswana and Malawi in the long-run. In Botswana, the findings regarding economic growth are different from that of Lesotlho (2006), who found that economic growth has a positive impact on private investment.

In South Africa, trade openness is a negative determinant, while in Botswana, it is a positive determinant. This means that an increase in trade openness will lead to a decrease in private investment in South Africa and an increase in Botswana in the long-run. In Botswana and Malawi, real interest is found to be a negative determinant, as expected. This means that an increase in real interest rate will lead to a decrease in domestic private investment. The findings are consistent with the findings of Magableh and Ajlouni (2016), and Akçay and Karasoy (2020). In South Africa, interest rate was found to have statistically insignificant influence in the level of private investment.

In the long-run, inflation was found to be a negative determinant in Malawi, as expected. This implies that an increase in inflation will result in a decrease in domestic private investment in the long-run. The negative relationship between inflation and private investment is consistent with the findings of Karagoz (2010). Also, consistent with the findings of Ayeni (2020), among others, inflation was found to have statistically insignificant impact on private investment in Botswana and South Africa.

The short-run findings show that in South Africa, Botswana and Malawi, the private investment in the previous period is a positive determinant of the current level of private investment. Thus, the performance of the investment in the previous period

has a significant influence on the level of private investment in the current period in all the three countries. Public investment is found to be a positive determinant in South Africa and a negative determinant in Botswana. In Botswana and Malawi, public investment from the previous period has a positive impact on private investment.

Credit to the private sector is a positive determinant of private investment in Botswana, while in South Africa and Malawi, it is found not to be statistically significant in the short-run. On the other hand, credit to the private sector in the previous period is found to have a negative impact on private investment in South Africa. The findings further reveal that in the short-run, real interest rate is a negative determinant, as expected in Malawi. This suggests that an increase in real interest rate will lead to a decrease in private investment in Malawi. In South Africa and Botswana, interest rate is found to be statistically insignificant.

Inflation is found to be a negative and statistically significant determinant of private investment in South Africa and Malawi, as expected, which implies that an increase in inflation will lead to a decrease in private investment in the short-run. In Botswana, inflation is found to be statistically insignificant. As expected, trade openness is a positive determinant in South Africa, Botswana and Malawi. That means that in the short-run, the openness of the economy can boost the level of private investment in all the three countries. The determinants of domestic private investment for each country in the short- and long-run are different and this could be due to the differences in the policies and strategies developed and implemented to encourage the participation of the private sector in each country.

As expected, the coefficients of the ECM for South Africa, Botswana and Malawi are negative and statistically significant at 1% level of significance. This means that domestic private investment adjusts to equilibrium at a speed of 64.20% in South Africa, 51.02% in Botswana and 42.66% per annum in Malawi in the event of a shock in the economy.

Table 7.5 summarises the results of the diagnostic tests for each country over the study period.

Table 7.5: Results of diagnostic tests

LM Statistics	South Africa	Botswana	Malawi
Normality	0.233 [0.890]	0.432 [0.806]	0.342 [0.843]
Serial Correlation	0.679 [0.422]	0.047 [0.954]	0.329 [0.723]
Heteroscedasticity	0.372 [0.970]	0.763 [0.688]	0.911 [0.551]
Functional Form	2.403 [0.141]	0.068 [0.797]	6.233* [0.021]

Notes: Normality test using the Jarque-Bera test; Serial correlation using the Lagrange Multiplier test; Heteroscedasticity using the Breusch-Pagan-Godfrey test; Functional form using the RESET test; the value in parenthesis is p-values; and * signifies significance at 5% level.

The results for the diagnostic tests confirm that the estimated model for South Africa, Botswana and Malawi passes all the tests for normality, heteroscedasticity and serial correlation. The Reset test which shows the functional form of the model is well specified for Botswana and South Africa, while for Malawi it is not the case. Although the model for Malawi fails the Reset test for functional form, stability tests based on the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMQ) show that the parameters in this model are stable over the sample period; and the ensuing results are regarded as reliable.

The CUSUM and the CUSUMQ are conducted to find out whether the model parameters are stable or not. The CUSUM and CUSUMQ results for South Africa, Botswana and Malawi that are presented in Figures 7.1, suggest that the estimated models are stable. This is confirmed by the CUSUM and CUSUMQ plots that are found to be within the confidence band at 5% level of significance for all the countries, namely, South Africa, Botswana and Malawi.

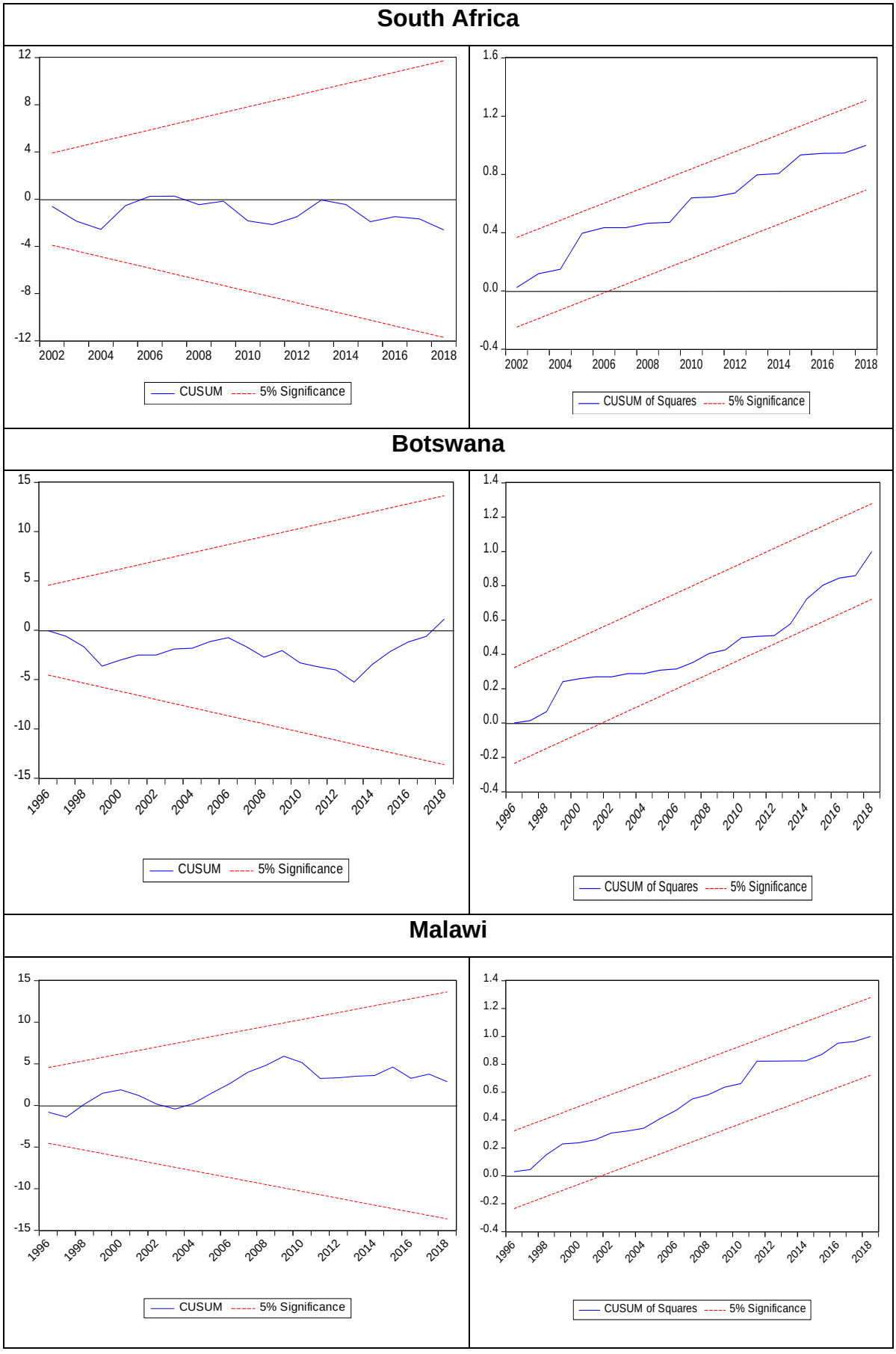


Figure 7.1: Plot of Cusum and CusumQ

7.4.2 Model 2: The crowding effect of public investment on private investment – ARDL and NARDL approach

7.4.2.1 Nonlinearity test results

Before the NARDL could be conducted, the variables are first examined to determine if they are nonlinear. The current study used the Brock-Dechert-Scheinkman (BDS) test that was developed by Brock, Scheinkman, Dechert and LeBaron (1996) to check the nonlinearity in the variables included in the study. For the BDS test, the null hypothesis is linearly dependence, and the alternative hypothesis is nonlinearly dependence and the rejection of the null hypothesis, which means that there is nonlinearity (Adebayo, Udemba, Ahmed & Kirikkaleli, 2021). The results indicate that the variables are nonlinear, and this is confirmed by the significance of the BDS test for South Africa, Botswana and Malawi.

The results of the BDS test in all the three countries are presented in Table 7.6. After confirming the nonlinearity of the variables in the model, the next step is to perform the NARDL model.

Table 7.6: BDS test for nonlinearity in all the three countries

South Africa										
Variables	**Dimension 2**		**Dimension 3**		**Dimension 4**		**Dimension 5**		**Dimension 6**	
	BDS Statistic	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**
$PrvI$	0.142***	0.000	0.226***	0.000	0.266***	0.000	0.279***	0.000	0.280***	0.000
Y	0.153***	0.000	0.246***	0.000	0.295***	0.000	0.317***	0.000	0.312***	0.000
$PubI$	0.175***	0.000	0.296***	0.000	0.391***	0.000	0.453***	0.000	0.487***	0.000
$CRED$	0.188***	0.000	0.313***	0.000	0.402***	0.000	0.460***	0.000	0.499***	0.000
INT	0.091***	0.000	0.148***	0.000	0.173***	0.000	0.189***	0.000	0.189***	0.000
INF	0.118***	0.000	0.198***	0.000	0.264***	0.000	0.296***	0.000	0.315***	0.000
TO	0.106***	0.000	0.160***	0.000	0.173***	0.000	0.178***	0.000	0.163***	0.000

Botswana										
Variables	**Dimension 2**		**Dimension 3**		**Dimension 4**		**Dimension 5**		**Dimension 6**	
	BDS Statistic	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**	**BDS Statistic**	**Prob**
$PrvI$	0.117***	0.000	0.182***	0.000	0.210***	0.000	0.212***	0.000	0.226***	0.000
Y	0.182***	0.000	0.305***	0.000	0.388***	0.000	0.445***	0.000	0.481***	0.000
$PubI$	0.064***	0.000	0.074***	0.000	0.067***	0.000	0.063***	0.000	0.054***	0.000
$CRED$	0.160***	0.000	0.257***	0.000	0.313***	0.000	0.337***	0.000	0.340***	0.000
INT	0.018***	0.011	0.018***	0.006	0.018***	0.000	0.014***	0.000	0.009***	0.000
INF	0.087***	0.000	0.102***	0.000	0.080***	0.000	0.050***	0.000	0.027***	0.001
TO	0.122***	0.000	0.181***	0.000	0.236***	0.000	0.281***	0.000	0.288***	0.000

Malawi										
Variables	Dimension 2		Dimension 3		Dimension 4		Dimension 5		Dimension 6	
	BDS Statistic	Prob	BDS Statistic	Prob	BDS Statistic	Prob	BDS Statistic	Prob	BDS Statistic	Prob
$PrvI$	0.079***	0.000	0.125***	0.000	0.140***	0.000	0.138***	0.000	0.126***	0.000
Y	0.151***	0.000	0.238***	0.000	0.277***	0.000	0.281***	0.000	0.247***	0.000
$PubI$	0.027***	0.000	0.053***	0.000	0.073***	0.000	0.089***	0.000	0.102***	0.000
$CRED$	0.121***	0.000	0.196***	0.000	0.225***	0.000	0.239***	0.000	0.231***	0.000
INT	0.076***	0.000	0.096***	0.000	0.082***	0.000	0.064***	0.000	0.045***	0.000
INF	0.055***	0.000	0.092***	0.000	0.112***	0.000	0.112***	0.000	0.091***	0.000
TO	0.046***	0.000	0.074***	0.000	0.073***	0.000	0.069***	0.000	0.055***	0.000

Notes: *** denote statistical significance at 1% level

7.4.2.2 Model 2a: The crowding effect of public investment on private investment – ARDL and NARDL approach

The ARDL and NARDL bounds test results

The results from the bounds test for the NARDL model confirm the existence of a long-run nonlinear relationship between private investment and its determinants for South Africa, Botswana and Malawi. For the ARDL model, the F-statistic is 6.981 for South Africa, 5.423 for Botswana and 4.005 for Malawi. The F-statistic is 4.120 for South Africa, 8.467 for Botswana and 7.650 for Malawi in the NARDL model. The computed F-statistic for all the three countries is above the upper-bound critical values as shown in Table 7.7. As a result, the null hypothesis of no cointegration is not accepted for all the three countries. The results of the NARDL cointegration establish that the impact of the positive and negative changes of public investment lead to a nonlinear response, in the sense that the response to the positive and negative changes is not the same (Ghosh, 2021). After confirming that the variables used in the study are cointegrated, the study continued by estimating the long- and short-run coefficients for the ARDL and NARDL model.

The results of the cointegration test are reported in Table 7.7, and the long- and short-run results are presented in Tables 7.8 to 7.10.

Table 7.7: Bounds F-test for cointegration results

Country	Model	F-Statistic	Cointegration status
South Africa	**ARDL:** $F(PrvI \mid Y, PubI, CRED, INT, INF, TO)$	6.981***	Cointegrated
	NARDL: $F(PrvI \mid Y, PubI^{+}, PubI^{-}, CRED, INT, INF, TO)$	4.120**	Cointegrated
Botswana	**ARDL:** $F(PrvI \mid Y, PubI, CRED, INT, INF, TO)$	5.423***	Cointegrated
	NARDL: $F(PrvI \mid Y, PubI^{+}, PubI^{-}, CRED, INT, INF, TO)$	8.467***	Cointegrated
Malawi	**ARDL:** $F(PrvI \mid Y, PubI, CRED, INT, INF, TO)$	4.005**	Cointegrated
	NARDL: $F(PrvI \mid Y, PubI^{+}, PubI^{-}, CRED, INT, INF, TO)$	7.650***	Cointegrated

Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	**Asymptotic critical values for ARDL Model**					
	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43
	Asymptotic critical values for NARDL Model					
	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.03	3.13	2.32	3.5	2.96	4.26

Notes: ***, **and * denote statistical significance at 1% and 5% level, respectively.

Table 7.8: Results of long- and short-run estimation in South Africa

Dependent variable is Prvl				
Panel A: Long-run results				
	ARDL		**NARDL**	
Regressor	**Coefficient**	**T-ratio [prob]]**	**Coefficient**	**T-ratio [prob]]**
$PubI$	1.9975***	4.543 [0.000]	_	_
$PubI^{+}$	_	_	-1.174	-0.888 [0.387]
$PubI^{-}$	_	_	1.157*	1.908 [0.075]
Y	0.0023***	3.063 [0.007]	-0.004***	3.457 [0.003]
$CRED$	0.0691**	-0.844 [0.408]	0.102***	3.975 [0.001]
INT	-0.1242	-0.346 [0.733]	0.071	0.670 [0.512]
INF	-0.0277	1.652 [0.114]	0.096	0.710 [0.488]
TO	-0.1912**	-2.123 [0.049]	-0.0456	-0.934 [0.367]

Panel B: Short-run results				
	ARDL		NARDL	
Regressor	**Coefficient**	**T-ratio [prob]]**	**Coefficient**	**T-ratio [prob]**
C	-2.0634	-0.754 [0.461]	-4.273***	-6.941 [0.000]
$\Delta PrvI(-1)$	0.5288***	3.956 [0.001]	0.379***	3.404 [0.004]
$\Delta PrvI(-2)$	0.5302***	3.011 [0.008]	_	_
$\Delta PubI$	1.2825***	3.495 [0.003]	_	_
$\Delta PubI^{+}$	_	_	-0.280	-0.524 [0.608]
$\Delta PubI^{+}(-1)$	_	_	1.531**	2.693 [0.016]
$\Delta PubI^{-}$	_	_	1.822***	5.156 [0.000]
ΔY	0.0014***	2.922 0.010]	-0.002*	-2.047[0.057]
$\Delta CRED$	-0.0019	-0.1000 [0.922]	0.010	1.077 [0.297]
$\Delta CRED(-1)$	-0.0943***	3.816 [0.001]	-0.033*	-2.055 [0.057]
ΔINT	-0.0798	-1.380 [0.186]	0.156***	4.491 [0.000]
ΔINF	-0.2575***	-2.863 [0.011]	-0.122***	-2.926 [0.010]

$\Delta INF(-1)$	-0.1116	1.674 [0.112]	-0.105**	-2.807 [0.013]
ΔTO	0.1772***	3.598 [0.002]	0.054	1.669 [0.115]
$\Delta TO(-1)$	0.1081**	2.231 [0.040]	_	_
$ECM(-1)$	-0.6420***	-8.131 [0.000]	-0.743***	-6.883 [0.000]

Test Statistic	**ARDL**	**NARDL**
R- Squared	0.881	0.897
Adjusted R-Squared	0.834	0.844
F-Statistic [Prob]	18.952 [0.000]	16.763 [0.000]
DW Statistic	2.209	2.121

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

_+ and _- denote increase and decrease in public investment.

Table 7.9: Results of long- and short-run estimation in Botswana

Dependent variable is Prvl				
Panel A: Long-run results				
	ARDL		**NARDL**	
Regressor	**Coefficient**	**T-ratio [prob]]**	**Coefficient**	**T-ratio [prob]]**
$PubI$	-0.4691	-1.193 [0.245]	_	_
$PubI^{+}$	_	_	-1.7240***	-3.451 [0.002]
$PubI^{-}$	_	_	-3.3952***	-4.437 [0.000]
Y	0.0004	0.381 [0.706]	-0.0050*	-2.058 [0.052]
$CRED$	0.3215	1.677 [0.107]	-0.9053**	-2.607 [0.017]
INT	-0.2429*	-1.909 [0.069]	0.5116**	2.341 [0.029]
INF	0.3086	1.045 [0.307]	-0.4159	-1.183 [0.250]
TO	0.1134**	2.402 [0.025]	0.1486***	3.159 [0.005]

Panel B: Short-run results				
	ARDL		NARDL	
Regressor	**Coefficient**	**T-ratio [prob]]**	**Coefficient**	**T-ratio [prob]]**
C	0.5805**	0.116 [0.909]	19.3676***	3.819 [0.001]
$\Delta PrvI(-1)$	0.2527*	1.867 [0.075]	_	_
$\Delta PubI$	-0.8520***	-3.652 [0.001]	_	_
$\Delta PubI(-1)$	0.3188***	1.832 [0.008]	_	_
$\Delta PubI^{+}$	_	_	-0.7890***	-3.185 [0.005]
$\Delta PubI^{+}(-1)$	_	_	1.4452***	4.704 [0.000]
$\Delta PubI^{+}(-2)$	_	_	0.7519**	2.546 [0.019]
$\Delta PubI^{-}$	_	_	-2.2156***	-6.336 [0.000]
ΔY	0.0002	0.380 [0.707]	-0.0024**	-2.528 [0.020]
$\Delta CRED$	0.6727***	3.765 [0.001]	0.1298	0.704 [0.489]

ΔINT	0.0530	0.953 [0.350]	0.2411***	3.526 [0.002]
ΔINF	-0.0389	-0.269 [0.790]	-0.1960	-1.456 [0.160]
ΔTO	0.0579**	2.210 [0.037]	0.0700***	3.126 [0.005]
$ECM(-1)$	-0.5102***	-6.918 [0.000]	-0.4713***	-9.503 [0.000]

Test Statistic	**ARDL**	**NARDL**
R-Squared	0.809	0.874
Adjusted R-Squared	0.763	0.847
F-Statistic [Prob]	17.573 [0.000]	32.447 [0.000]
DW Statistic	1.829	2.164

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively

_+ and _- denotes increase and decrease in public investment.

Table 7.10: Results of long- and short-run estimation in Malawi

Dependent variable is Prvl				
Panel A: Long-run results				
	ARDL		**NARDL**	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
$PubI$	0.2821	-0.335 [0.741]	_	_
$PubI^{+}$	_	_	3.1955	1.087 [0.291]
$PubI^{-}$	_	_	3.5080	1.169 [0.257]
Y	-0.0128	-0.413 [0.683]	0.0353	0.425 [0.676]
$CRED$	-0.2018	-0.577 [0.569]	-4.0322	-1.542 [0.140]
INT	-0.2198*	-1.916 [0.068]	-0.3434	-1.148 [0.265]
INF	-0.3752**	-2.410 [0.024]	-1.7555*	-1.791 [0.089]
TO	0.2311	1.010 [0.323]	1.4128	1.644 [0.117]

Panel B: Short-run results				
	ARDL		NARDL	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
C	5.3992	0.946 [0.354]	7.690	1.236 [0.232]
$\Delta PrvI(-1)$	0.4047***	2.711 [0.013]	_	_
$\Delta PubI$	-0.234	-0.944 [0.355]	_	_
$\Delta PubI(-1)$	0.1144	0.527 [0.603]	_	_
$\Delta PubI(-2)$	0.4970***	3.067 [0.006]	_	_
$\Delta PubI^{+}$	_	_	-0.6175**	-2.212 [0.039]
$\Delta PubI^{+}(-1)$	_	_	-1.4711**	-2.659 [0.016]
$\Delta PubI^{-}$	_	_	-0.2562	-0.400 [0..694]
ΔY	-0.0054	-0.424 [0.675]	-0.0268	-1.572 [0.132]
$\Delta CRED$	-0.0861	0.623 [0.539]	-0.4511	-1.453 [0.163]

ΔINT	-0.0937**	-2.037 [0.053]	-0.0843	-1.422 [0.171]
ΔINF	-0.1601***	-3.175 [0.004]	-0.1789***	-3.015 [0.007]
$\Delta INF(-1)$	_	_	0.1789***	4.739 [0.000]
$\Delta INF(-2)$	_	_	0.0922**	2.637 [0.016]
ΔTO	0.2170***	3.658 [0.001]	0.3470***	4.985 [0.000]
$ECM(-1)$	-0.4266***	-5.946 [0.000]	-0.2456***	-9.151 [0.000]

Test Statistic	ARDL	NARDL
R- Squared	0.684	0.786
Adjusted R-Squared	0.619	0.720
F-Statistic [Prob]	10.470 [0.000]	11.932 [0.000]
DW Statistic	2.147	2.222

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

_+ and _- denotes increase and decrease in public investment.

For the ARDL model, in the long-run, public investment is found to have a positive impact on private investment in South Africa, while in Botswana and Malawi, it is found to be statistically insignificant. The findings suggests that public investment crowds in private investment in South Africa but does not have any crowding effect on private investment in the other two study countries.

In the short-run, for the ARDL model, the study found that public investment has a positive impact on private investment in South Africa, and implies that public investment crowds in private investment. In Botswana, public investment has a negative and statistically significant influence on private investment. This means that an increase in public investment will lead to a decrease in private investment. Hence, public investment has crowding out effects on private investment in Botswana in the short-run. In Malawi, it is found to have statistically insignificant crowding effects, however, the public investment in the previous period is found to crowds in private investment.

The other variables in the long-run for the ARDL model show that interest rate and inflation have statistically insignificant effect on private investment, while economic growth, credit to the private sector and trade openness have statistically significant effect on private investment in South Africa. In Botswana, interest rate is found to have a negative impact, while trade openness has a positive influence on private investment, however, economic growth, credit to the private sector and inflation rate are found to be statistically insignificant. Interest rate and inflation are found to have a negative impact on private investment, while economic growth, credit to the private sector and trade openness are found to be statistically insignificant.

The other variables in the short-run for the ARDL model indicate that previous private investment has a positive effect on the current private investment in all the three countries. Economic growth has statistically significant positive impact only in South Africa, while credit to the private sector has a positive impact only in Botswana. Interest rate has a negative and statistically significant effect on private investment only in Malawi, while inflation has statistically significant negative impact in South Africa and Malawi. Lastly, trade openness is found to have a positive effect on private investment in all the three countries in the short-run.

The NARDL long-run results indicate that in South Africa, the coefficient of the positive shock in public investment is negative, and for the negative shock in public investment, is positive. However, the coefficient of the positive shock in public investment is statistically insignificant while the coefficient for the negative shock in public investment is statistically significant. This means that the negative shock in public investment will lead to a decrease in private investment

In Botswana, the coefficients of the positive and negative shocks in public investment are negative and statistically significant. The results suggest that the positive shock in public investment leads to a decrease in private investment while the negative shock in public investment leads to an increase in private investment in the long-run. In Malawi, the coefficients of the positive and negative shocks in public investment are positive but statistically insignificant in the long-run.

The NARDL short-run results show that in South Africa, the coefficient of the positive shock in public investment is negative and statistically insignificant while for the negative shock in public investment it is positive and statistically significant. The findings indicate that the negative shock in public investment will lead to a decrease in private investment in the short-run in South Africa.

In Botswana, the coefficients of the positive and negative shocks in public investment are negative and statistically significant at 1% level of significance. The results suggest that the positive shock in public investment leads to a decrease in private investment while the negative shock in public investment leads to an increase in private investment in the short-run.

In Malawi, the coefficients of the positive and negative shocks in public investment are negative. However, the positive shock in public investment is found to be statistically significant at 5% level of significance, while the negative shock in public investment is found to be statistically insignificant. Therefore, positive shock in public investment leads to a decrease in private investment in Malawi in the short-run. Just as in South Africa, the positive shock in public investment in the previous period has a positive impact on private investment in Botswana, while in Malawi, it has a negative impact on private investment.

In South Africa, the other variables in the long-run for the NARDL model show that economic growth have a negative and statistically significant impact on private

investment. This means that an increase in economic growth will lead to a decrease in private investment. Credit to the private sector is found to have a statistically significant positive impact on private investment in the long-run. This means that an increase in the availability of credit to the private sector, it will lead to an increase in private investment in the long-run in South Africa. In Botswana, inflation has statistically insignificant effect, while economic growth and credit to the private sector have a negative impact, and trade openness and interest rate have a positive impact on private investment. In Malawi, inflation is found to have a negative impact on private investment, but economic growth, credit to the private sector, interest rate and trade openness have no statistically significant impact.

The results for the other variables in the short-run for the NARDL model in the study show that in South Africa and Botswana, economic growth has a negative and statistically significant impact on private investment while it is statistically insignificant in Malawi. Interest rate was found to have a positive impact in South Africa and Botswana, while it is statistically insignificant in Malawi. Inflation was found to be statistically insignificant in Botswana, while in South Africa and Malawi, it had a negative impact on private investment. Inflation from the previous period is found to have a positive effect on private investment in the short-run in Malawi, while in South Africa, it has a negative and statistically significant impact. Trade openness had a positive and statistically significant influence on private investment in Botswana and Malawi while it is statistically insignificant in South Africa. Credit to the private sector was found to be statistically insignificant in all the three countries in the short-run.

The Wald test was used to determine the presence of asymmetric or symmetric relationships between public investment and private investment in South Africa, Botswana and Malawi. The null hypothesis is that there is a symmetric relationship against the alternative that there is an asymmetric relationship. The Wald test results confirm that if there is asymmetry, the null hypothesis is rejected and if there is symmetry, the null hypothesis is not rejected.

Table 7.11 presents the results of the long- and short-run asymmetries using the Wald test.

Table 7.11: Long- and short-run asymmetry results

Country	Test	F-statistic	Prob	Decision
South Africa	W_{LR}	8.394**	0.011	Asymmetric
	W_{SR}	3.824*	0.068	Asymmetric
Botswana	W_{LR}	16.461***	0.001	Asymmetric
	W_{SR}	40.103***	0.000	Asymmetric
Malawi	W_{LR}	0.418	0.526	Symmetric
	W_{SR}	4.512**	0.047	Asymmetric

Notes: W_{LR} is long-run asymmetric test; W_{SR} is short-run asymmetric test;*, ** and *** signifies significance at 10%, 5% and 1% level.

The results from the Wald test suggest that there is an asymmetric relationship between public investment and private investment for South Africa and Botswana in the long- and short-run. This suggests that the impact of the positive and negative shocks of public investment on private investment are different. In Malawi, there is a symmetric relationship in the long-run, and an asymmetric relationship in the short-run. The empirical findings of the study confirm that public investment asymmetrically impacts private investment in South Africa, Botswana and Malawi. The diagnostic tests of normality, functional form, serial correlation and heteroscedasticity were also done.

The diagnostic tests for serial correlation, heteroscedasticity, normality and functional form were carried out for the ARDL and NARDL model in South Africa, Botswana and Malawi.

Table 7.12 summarises the results of the diagnostic tests for Model 2a in South Africa, Botswana and Malawi over the study period.

Table 7.12: Results of diagnostic tests

LM Statistics	South Africa		Botswana		Malawi	
	ARDL	NARDL	ARDL	NARDL	ARDL	NARDL
Normality	0.233 [0.890]	0.270 [0.874]	0.432 [0.806]	1.720 [0.423]	0.342 [0.843]	1.911 [0.385]
Serial Correlation	0.679 [0.422]	1.393 [0.281]	0.047 [0.954]	0.632 [0.542]	0.329 [0.723]	1.336 [0.289]
Heteroscedasticity	0.372 [0.970]	0.777 [0.706]	0.763 [0.688]	0.755 [0.694]	0.911 [0.551]	0.815 [0.653]
Functional Form	2.403 [0.141]	0.009 [0.924]	0.068 [0.797]	0.629 [0.437]	6.233* [0.021]	5.684* [0.028]

Notes: Normality test using the Jarque-Bera test; Serial correlation using the Lagrange Multiplier test; Heteroscedasticity using the Breusch-Pagan-Godfrey test and Functional form using the RESET test; * signify significance at 5% level.

The diagnostic tests results show that the ARDL and NARDL model passed all the tests in South Africa and Botswana while Malawi failed the functional form test. Although the model for Malawi fails the Reset test for functional form, stability tests based on the CUSUM and CUSUMQ show that the parameters in this model are stable over the sample period; and the ensuing results are regarded as reliable.

The dynamic multiplier graph is used to check for asymmetry due to positive and negative shocks. The adjustment of private investment to positive shock in public investment is shown by the black line in Figure 7.2, while the dotted black line shows the adjustment of private investment to the negative shock. The asymmetric line which indicates the difference between the positive and negative shocks in public investment is represented by the red dotted line. The plots of the dynamic multiplier graphs for South Africa, Botswana and Malawi are presented in Figure 7.2.

The CUSUM and CUSUMQ plots indicate evidence of stability, as the plots are within the confidence band at 5% level of significance for all the three countries. The CUSUM and CUSUMQ plots for model 2a for South Africa, Botswana and Malawi are presented in Figure 7.3 (following Figure 7.2).

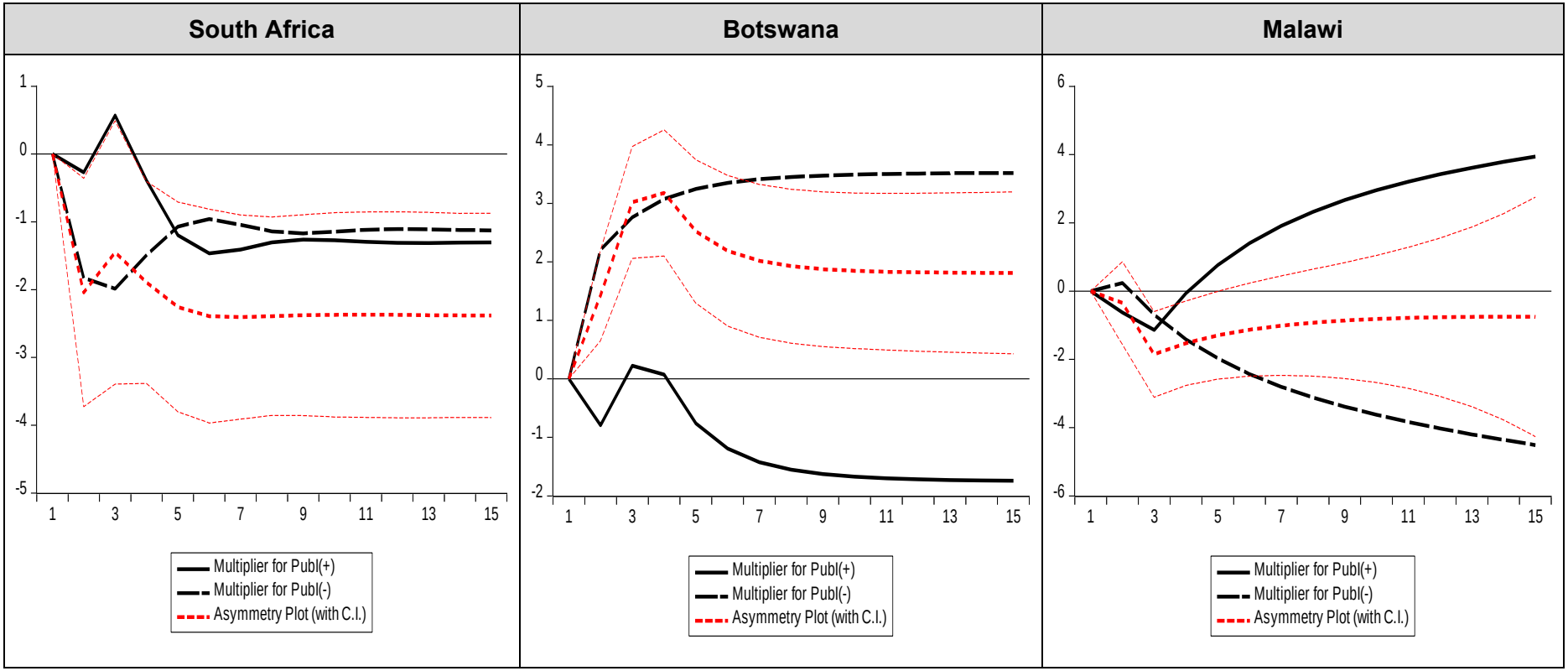
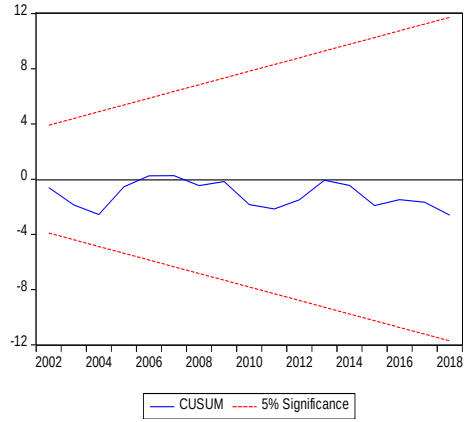
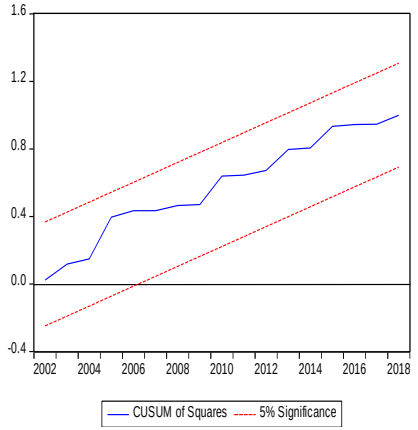


Figure 7.2: Plot of dynamic multiplier graph

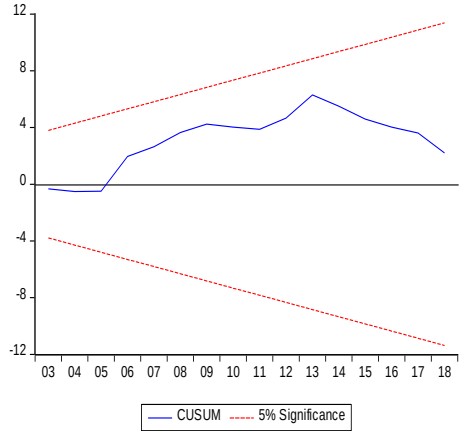
South Africa

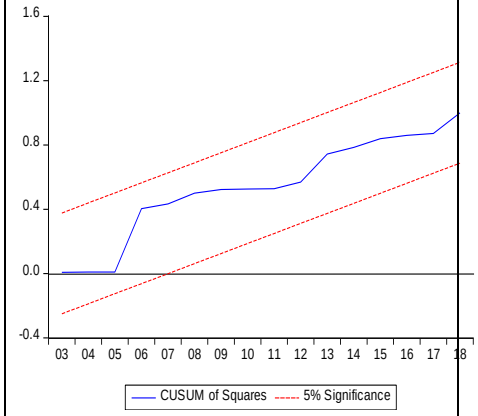
ARDL





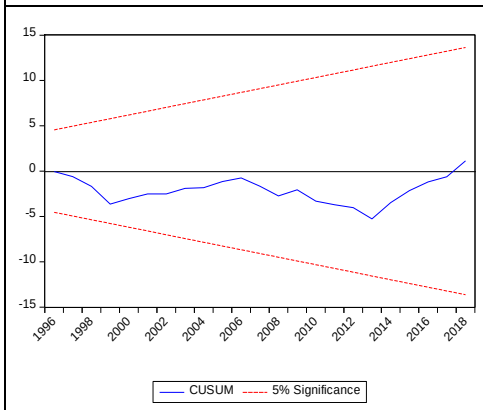
NARDL

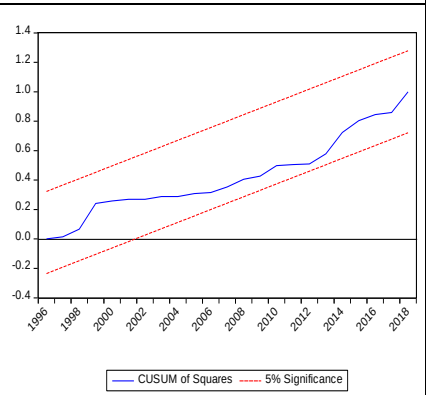




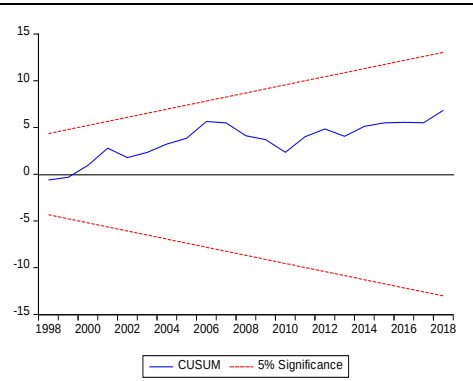
Botswana

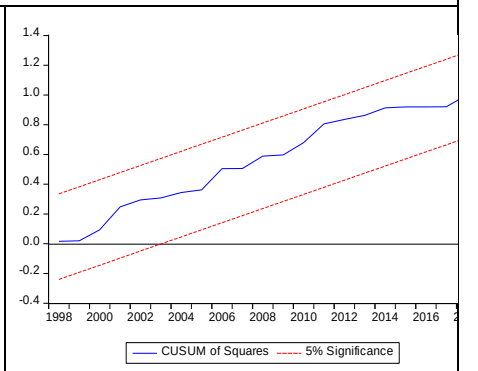
ARDL





NARDL





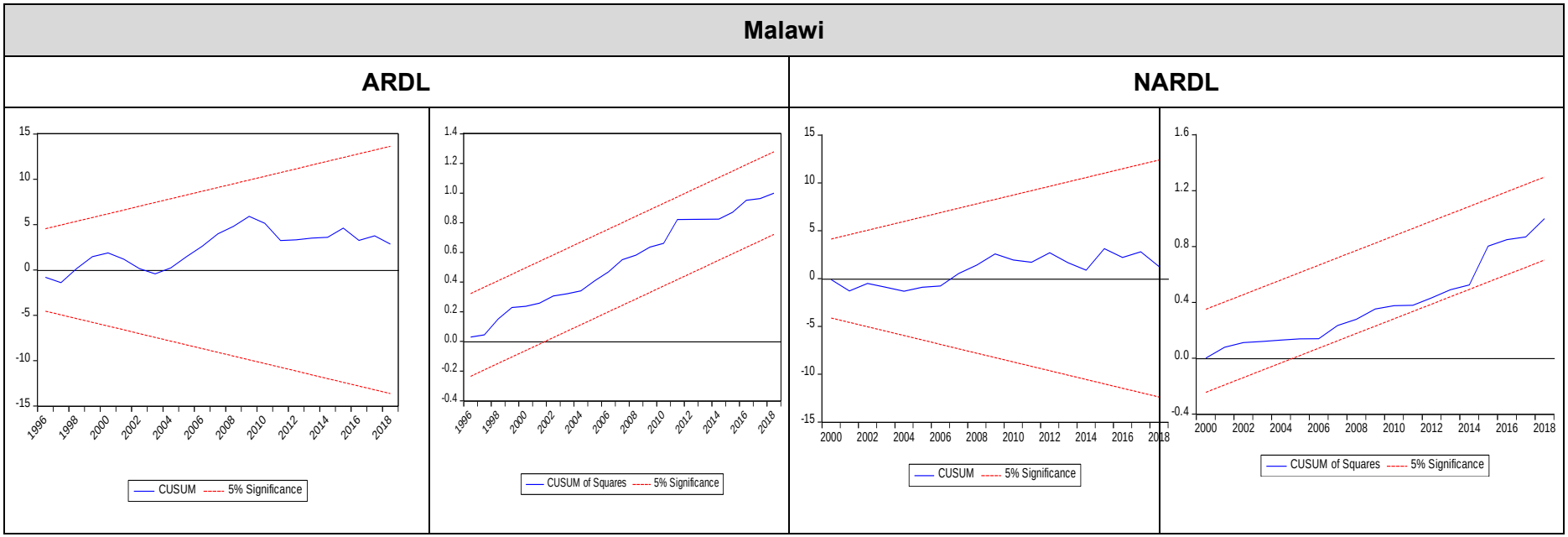


Figure 7.3: Plot of Cusum and CusumQ: ARDL and NARDL Model

7.4.2.3 Model 2b: The crowding effect of infrastructure public investment on private investment – ARDL approach

Results of the ARDL Bounds Test

The F-statistic for South Africa is 6.411, for Botswana it is 3.788, and for Malawi, it is 9.197. The results confirm the presence of cointegration between private investment and its determinants, as the calculated F-statistic results are above the Pesaran *et al*. (2001) upper bound critical values at 1% level of significance, respectively. The results of the cointegration test for South Africa, Botswana and Malawi are reported in Table 7.13.

Table 7.13: Bounds F-test for cointegration results

Country	Model	F-Statistic	Cointegration status
South Africa	$F(PrvI \mid Y, PubInfr, CRED, INT, INF, TO)$	6.411***	Cointegrated
Botswana	$F(PrvI \mid Y, PubInfr, CRED, INT, INF, TO)$	3.788**	Cointegrated
Malawi	$F(PrvI \mid Y, PubInfr, CRED, INT, INF, TO)$	9.197***	Cointegrated

Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	Asymptotic critical values for ARDL Model					
	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43

Notes:** and *** denotes statistical significance at 5% and 1% level.

The study estimated the short- and long-run coefficients, after confirming that private investment and the determinants are cointegrated.

The long- and short-run results for all the three countries are presented in Table 7.14.

Table 7.14: Results of long- and short-run estimation

Dependent variable is Prvl						
Panel A: Long-run results						
	South Africa		**Botswana**		**Malawi**	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
$PubInfr$	2.1076***	4.849 [0.000]	-0.5202	1.169 [0.263]	0.3516	1.319 [0.200]
Y	0.0021***	3.131 [0.006]	0.0007	0.451 [0.659]	-0.0400*	-1.908 [0.069]
$CRED$	0.0713**	2.425 [0.028]	0.4882*	1.982 [0.069]	-0.5603	1.655 [0.112]
INT	-0.1437	-1.506 [0.152]	0.3504	1.485 [0.162]	-0.2093**	-2.357 [0.027]
INF	-0.1495	-1.337 [0.200]	0.4663	1.175 [0.261]	-0.7784***	-3.977 [0.001]
TO	-0.2475***	-2.922 [0.010]	0.2323**	2.679 [0.019]	0.6887***	3.254 [0.004]

Panel B: Short-run results						
	South Africa		Botswana		Malawi	
Regressor	Coefficient	T-ratio [prob]	Coefficient	T-ratio [prob]	Coefficient	T-ratio [prob]
C	0.3357	0.139 [0.891]	-13.388***	-5.892 [0.000]	1.0490	0.335 [0.741]
$\Delta PrvI(-1)$	0.6488***	4.411 [0.000]	_	_	0.3521**	2.597 [0.016]
$\Delta PrviI(-2)$	0.3639**	2.158 [0.047]	_	_	_	_
$\Delta PubInfr$	0.6753***	3.264 [0.005]	-0.3982***	-8.458 [0.000]	-0.0743	-1.120 [0.274]
$\Delta PubInfr(-1)$	-0.4798**	-2.675 [0.017]	-0.3299***	-5.466 [0.000]	-0.1913***	-2.901 [0.008]
$\Delta PubInfr(-2)$	_	_	-0.1834***	-3.074 [0.009]	_	_
ΔY	0.0014***	3.019 [0.008]	0.0003	0.255 [0.803]	-0.0188**	-2.475 [0.021]
$\Delta Y(-1)$	_	_	0.0030**	2.600 [0.022]	_	_
$\Delta CRED$	-0.0124	-0.693 [0.498]	0.1981	1.541 [0.147]	-0.2632**	-2.071 [0.050]
$\Delta CRED(-1)$	-0.0982***	-3.832 [0.002]	-0.3263***	-3.167 [0.007]	_	_

$\Delta CRED(-2)$	_	_	-0.7970***	-7.337 [0.000]	_	_
ΔINT	-0.0971	-1.682 [0.112]	0.1653*	2.051 [0.061]	-0.0983**	-2.624 [0.015]
ΔINF	-0.2512**	-2.709 [0.016]	0.3786***	3.437 [0.004]	-0.2723***	-5.706 [0.000]
$\Delta INF(-1)$	_	_	0.3121**	2.757 [0.016]	0.0922***	3.124 [0.005]
$\Delta INF(-2)$	_	_	0.5135***	4.098 [0.001]	_	_
ΔTO	0.1453***	3.174 [0.006]	-0.0127	-0.376 [0.713]	0.3234***	5.726 [0.000]
$\Delta TO(-1)$	0.0848*	1.810 [0.089]	-0.0615*	-2.013 [0.065]	_	_
$ECM(-1)$	-0.6754***	-7.856 [0.000]	-0.4718***	-6.226 [0.000]	-0.4698***	-9.010 [0.000]

Test Statistic	South Africa	Botswana	Malawi
R- Squared	0.888	0.922	0.749
Adjusted R-Squared	0.837	0.865	0.697
F-Statistic [Prob]	17.372 [0.000]	16.064 [0.000]	14.404 [0.000]
SE of Regression	0.438	0.944	1.627
Residual Sum of Squares	4.214	16.923	76.750
DW Statistic	2.218	2.161	1.945

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

The long-run results for South Africa indicate that infrastructure public investment has a positive influence on private investment. The findings suggest that infrastructure public investment crowds in private investment in the long-run. The results are similar to those found by Makuyana and Odhiambo (2018) in the case of South Africa. Although unexpected, infrastructure public investment is found to be statistically insignificant in Botswana and Malawi in the long-run. Other studies that have also found the insignificant impact of infrastructure public investment on private investment include Muthu (2017) for India.

The short-run results for South Africa show that infrastructure public investment is positive and statistically significant at 1%. This suggests that it crowd in private investment in the short-run. The findings are supported by studies, such as that of Dash (2016), who found that public infrastructure has a positive effect on private investment. It is also found that infrastructure public investment from the previous period crowded out private investment in the short-run in South Africa.

In Botswana, infrastructure public investment crowds out private investment in the short-run. This finding in Malawi also suggests that infrastructure public investment from the previous period in the short-run crowds out private investment. Makuyana and Odhiambo (2019) also found that infrastructural public investment crowds out private investment in the short-run in Malawi.

The results of the other variables in the long-run reveal that economic growth has a positive and statistically significant influence on private investment in South Africa, and it has a negative influence to private investment in Malawi. Credit to the private sector has a positive effect on private investment in South Africa and Botswana. Real interest rate has a negative influence in Malawi. Inflation has a negative effect in Malawi, while in South Africa and Botswana, it is statistically insignificant. Trade openness has a positive influence on private investment in Botswana and Malawi, while it has a negative impact in South Africa.

The findings in the short-run for the other variables show that private investment from the previous period, economic growth, and trade openness have a positive and significant effect, while credit to the private sector in the previous period and inflation have a negative and statistically significant impact on private investment in South Africa.

In Botswana, interest rate and inflation have a positive and statistically significant impact on private investment. Credit to the private sector in the previous period and trade openness in the previous period are found to have a negative effect on private investment. Economic growth from the previous period and inflation in the previous period have a positive and statistically significant impact on private investment in Botswana in the short-run. In Malawi, the effect of economic growth, credit to the private sector, real interest rate and inflation on private investment is negative, while inflation in the previous period and trade openness show a positive impact on private investment.

Table 7.15 presents the results of the diagnostic tests for Model 2b in South Africa, Botswana and Malawi.

Table 7.15: Results of diagnostic tests

LM Statistics	South Africa	Botswana	Malawi
Normality	2.945 [0.229]	0.160 [0.923]	2.549 [0.280]
Serial Correlation	0.508 [0.612]	0.530 [0.603]	0.116 [0.891]
Heteroscedasticity	0.448 [0.941]	0.908 [0.589]	0.369 [0.962]
Functional Form	1.066 [0.318]	1.335[0.207]	5.313* [0.031]

Notes: Normality test using the Jarque-Bera test, Serial correlation using the Lagrange Multiplier test; Heteroscedasticity using the Breusch-Pagan-Godfrey test and Functional form using the RESET test; the value in parenthesis is p-values; and * signifies significance at 5% level.

The diagnostic tests results show that the model passes the tests of serial correlation, normality, heteroscedasticity and functional form in South Africa and Botswana while Malawi fails the functional form test. Although the model for Malawi fails the Reset test for functional form, stability tests based on the CUSUM and the CUSUMQ show that the parameters in this model are stable over the sample period; and the ensuing results are regarded as reliable.

The CUSUM and CUSUMQ tests were conducted to verify the stability of the parameters in the model, and the results indicate evidence of stability in South Africa, Botswana and Malawi, as shown by the plots that are within the confidence band at 5% level of significance.

The CUSUM and CUSUMQ plots for model 2b for all the three countries are presented in Figure 7.4.

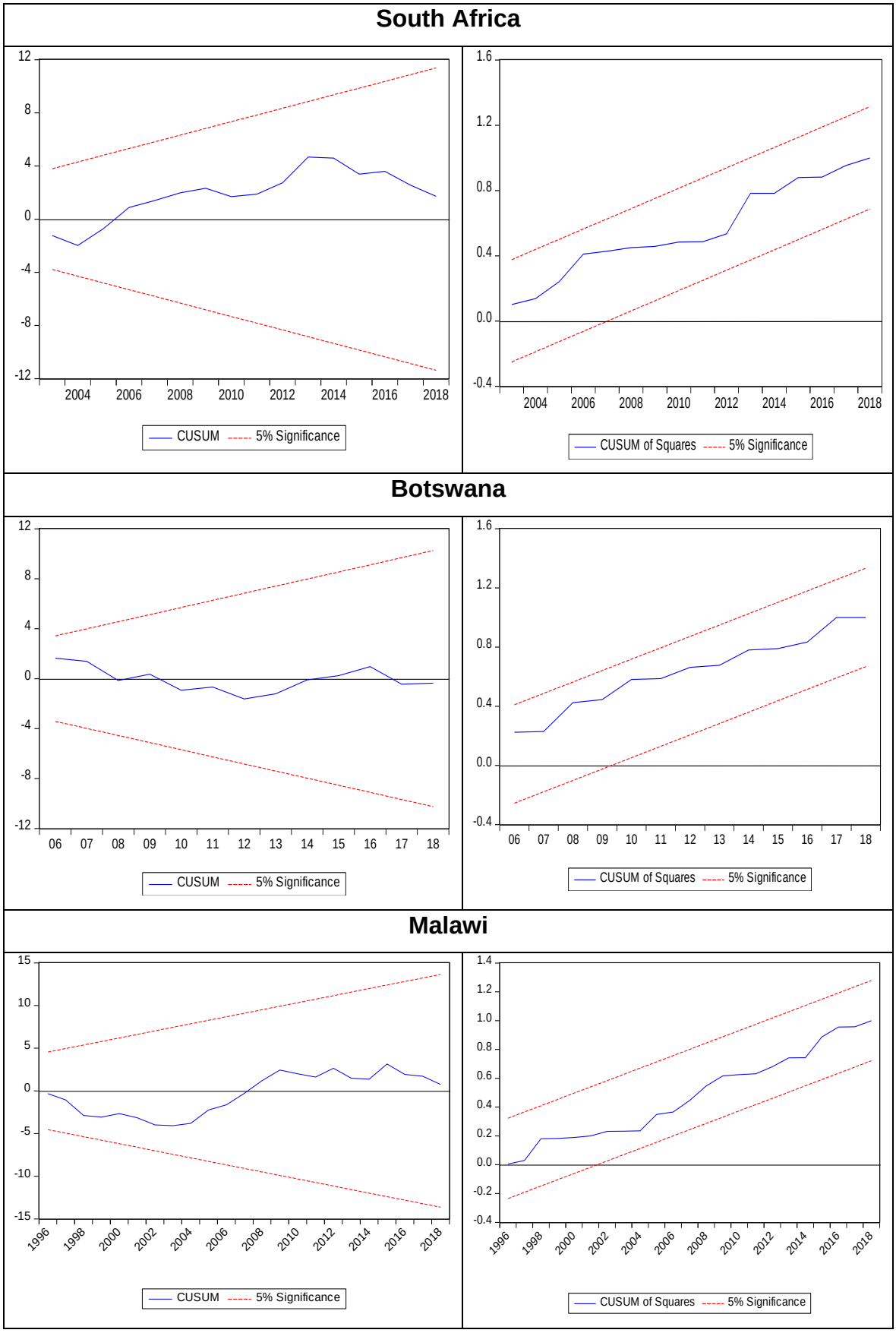


Figure 7.4: Plot of Cusum and CusumQ

7.4.2.4 Model 2c: The crowding-in/out of non-infrastructure public investment on private investment – ARDL

Results of the ARDL bounds test

The cointegration results indicate that the F-statistic for South Africa is 6.131, for Botswana it is 4.496 and for Malawi it is 6.775, as shown in Table 7.16. The results of the cointegration test for South Africa, Botswana and Malawi are reported in Table 7.16.

Table 7.16: Results of the ARDL bounds test

Country	Model	F-Statistic	Cointegration status
South Africa	$F(PrvI\|\ Y, PubNonInfr, CRED, INT, INF, TO)$	6.131***	Cointegrated
Botswana	$F(PrvI\|\ Y, PubNonInfr, CRED, INT, INF, TO)$	4.496***	Cointegrated
Malawi	$F(PrvI\|\ Y, PubNonInfr, CRED, INT, INF, TO)$	6.755***	Cointegrated

Asymptotic critical values						
Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.12	3.23	2.45	3.61	3.15	4.43

Notes: *** denotes statistical significance at 1% level.

The long- and short-run results are presented in Table 7.17.

Table 7.17: Results of long- and short-run estimation

Dependent variable is Prvl						
Panel A: Long-run results						
	South Africa		**Botswana**		**Malawi**	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
$PubNonInfr$	-1.7451*	-1.800 [0.087]	0.0830	0.189 [0.853]	-0.6709*	-1.987 [0.060]
Y	0.0021**	2.262 [0.035]	0.0007	0.441 [0.666]	-0.0189	-1.033 [0.313]
$CRED$	-0.0157	-0.844 [0.408]	0.4660*	2.086 [0.056]	-0.3271	-1.128 [0.272]
INT	0.0504	-0.346 [0.733]	0.3413	1.707 [0.110]	-0.2197***	-2.844 [0.009]
INF	0.2020	1.652 [0.114]	0.2984	0.837 [0.417]	-0.5411***	-3.281 [0.003]
TO	0.0058	0.086 [0.933]	0.2227**	2.887 [0.012]	0.3715*	1.908 [0.070]

Panel B: Short-run results						
	South Africa		Botswana		Malawi	
Regressor	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**	**Coefficient**	**T-ratio [prob]**
C	0.9509	0.364 [0.719]	-8.8557	-1.532 [0.148]	4.3423	1.583 [0.128]
$\Delta PrvI(-1)$	0.5105***	3.897 [0.001]	_	_	0.4804***	4.664 [0.000]
$\Delta PrviI(-2)$	0.0954	0.859 [0.401]	_	_	_	_
$\Delta PrvI(-3)$	0.2285*	1.797 [0.087]	_	_	_	_
$\Delta PubnonInfr$	-0.8330**	-2.472 [0.023]	0.7408***	6.997 [0.000]	0.0732	0.819 [0.421]
$\Delta PubNonInfr(-1)$	_	_	0.5228***	4.177 [0.001]	0.2957***	3.265 [0.004]
$\Delta PubNonInfr(-2)$	_	_	0.3241***	3.104 [0.008]	_	_
ΔY	0.0010	1.584 [0.129]	-0.0001	-0.094 [0.926]	-0.0101	-0.124 [0.273]
$\Delta Y(-1)$	_	_	0.0031*	2.079 [0.056]	_	_
$\Delta CRED$	-0.0075	-0.802 [0.432]	0.2423	1.043 [0.315]	-0.1753	1.307 [0.205]
$\Delta CRED(-1)$	_	_	-0.2603*	-1.975 [0.068]	_	_
$\Delta CRED(-2)$	_	_	-0.8249***	-5.233 [0.000]	_	_
ΔINT	0.0754*	1.724 [0.100]	0.1612*	2.106 [0.054]	-0.1177***	3.246 [0.004]

ΔINF	-0.0168	-0.264 [0.794]	0.4737**	2.709 [0.017]	-0.2497***	-5.191 [0.000]
$\Delta INF(-1)$	_	_	0.4325**	2.730 [0.016]	0.0757**	2.547 [0.018]
$\Delta INF(-2)$	_	_	0.6125***	3.773 [0.002]	_	
ΔTO	0.1174***	3.481 [0.002]	0.0139	0.270 [0.791]	0.2947***	5.220 [0.000]
$\Delta ECM(-1)$	-0.4774***	-7.469 [0.000]	-0.4723***	-6.706 [0.000]	-0.5359***	-7.758 [0.000]

Test Statistic	South Africa	Botswana	Malawi
R- Squared	0.861	0.925	0.779
Adjusted R-Squared	0.824	0.877	0.724
F-Statistic [Prob]	23.089 [0.000]	19.100 [0.000]	14.131 [0.000]
SE of Regression	0.453	0.900	1.551
Residual Sum of Squares	5.329	16.193	67.395
DW Statistic	2.361	2.293	2.238

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

The long-run results show that non-infrastructure public investment has a negative effect in South Africa and Malawi. The findings suggest that non-infrastructure public investment crowds out private investment in South Africa and Malawi. Botswana is the only country where non-infrastructure public investment is found to be statistically insignificant.

The short-run results indicate that non-infrastructure public investment has a negative and statistically significant effect on private investment in South Africa. The means that non-infrastructure public investment crowds out private investment in the short-run. The findings are consistent with the results of Makuyana and Odhiambo (2018), who also found that non-infrastructure public investment crowds out private investment in South Africa in the short-run. In Botswana, the current and previous non-infrastructure public investments have a positive effect on private investment. This implies that non-infrastructure public investment from the current and previous period has a crowding in effect on private investment growth in Botswana. As in Botswana, non-infrastructure public investment in the previous period has a positive and statistically significant effect on private investment in Malawi. This implies that non-infrastructure public investment from the previous period crowds in private investment in Malawi in the short-run.

The findings of the other variables in the long-run show that economic growth has a positive and statistically significant impact only in South Africa, while credit to the private sector has a positive and statistically significant effect on private investment in Botswana only. In Malawi, real interest rate and inflation have a negative and statistically significant impact on private investment in the long-run. The results further show that trade openness has a positive impact on private investment in Botswana and Malawi, while in South Africa it is statistically insignificant.

The results of the other variables in the short-run indicate that private investment in the previous period and trade openness are found to have a positive influence in the short-run for South Africa and Malawi, while economic growth from the previous year has a positive and statistically significant effect on private investment only in Botswana. The credit to the private sector in the previous period has a negative effect on private investment, while interest rate and inflation have a positive influence in the short-run for Botswana. In Malawi, inflation and real interest rate have a negative

influence on private investment, while in South Africa, real interest rate has a positive effect on private investment.

Table 7.18 presents the results of the diagnostic tests for Model 2c in South Africa, Botswana and Malawi.

Table 7.18: Results of diagnostic tests

LM Statistics	South Africa	Botswana	Malawi
Normality	1.369 [0.504]	0.976 [0.614]	2.092 [0.351]
Serial Correlation	1.633 [0.217]	0.316 [0.735]	0.539 [0.592]
Heteroscedasticity	0.790 [0.663]	0.732 [0.740]	0.414 [0.948]
Functional Form	0.779 [0.389]	0.611 [0.448]	3.982* [0.059]

Notes: Normality test using the Jarque-Bera test, Serial correlation using the Lagrange Multiplier test; Heteroscedasticity using the Breusch-Pagan-Godfrey test and Functional form using the RESET test; the value in parenthesis is p-values; and * signifies significance at 5% level.

The results in Table 7.18 show that there is no problem of serial correlation in the model. The error term of the model is normally distributed and there is no problem of heteroscedasticity. The model is well specified for South Africa and Botswana, while for Malawi, it is not the case, as shown by the functional form test. Although the model for Malawi fails the Reset test for functional form, stability tests based on the CUSUM and CUSUMQ show that the parameters in this model are stable over the sample period; and the ensuing results are regarded as reliable.

The CUSUM and CUSUMQ tests were conducted to verify the stability of the parameters in the study's model, and the results indicate evidence of stability in South Africa, Botswana and Malawi, as shown by the plots that are within the confidence band at 5% level of significance. The CUSUM and CUSUMQ plots for model 2b for all the three countries are presented in Figure 7.5.

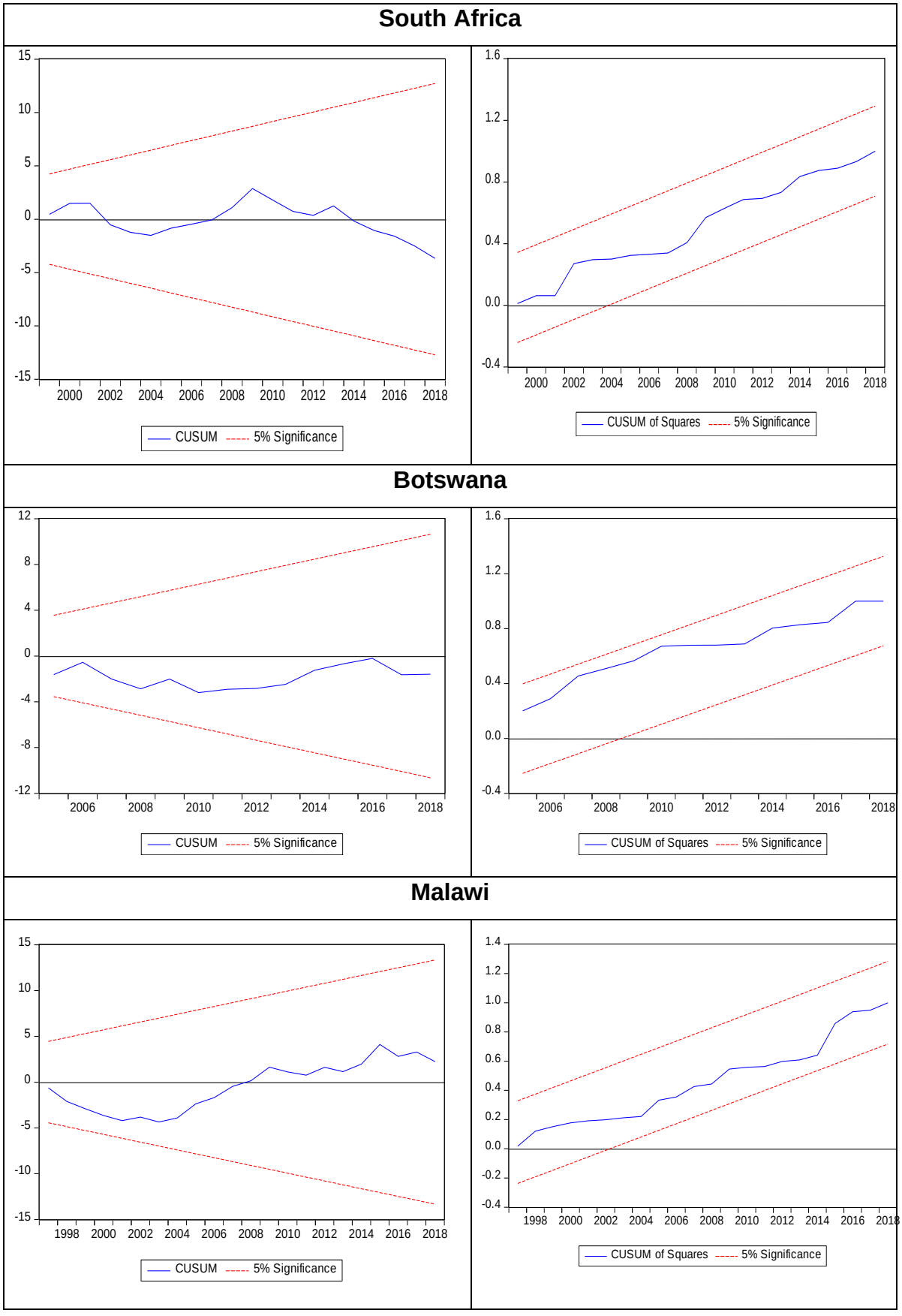


Figure 7.5: Plot of Cusum and CusumQ

7.4.3 Model 3: Multivariate Granger-Causality

7.4.3.1 Results of ARDL Bounds test

To determine the direction of the causal relationship between the variables, the study started by performing the bounds F-statistic test for cointegration to confirm if there is cointegration or not among the variables that are included in the model.

The results of the cointegration test for South Africa, Botswana and Malawi are reported in Table 7.19.

Table 7.19: Bounds F-test for cointegration: All three countries

South Africa		
Dependent variable	**F-Statistic**	**Conclusion**
$PrvI$	6.981***	Cointegrated
Y	4.261**	Cointegrated
$PubI$	5.277***	Cointegrated
$CRED$	5.174***	Cointegrated
INT	1.168	Not cointegrated
INF	4.812***	Cointegrated
TO	5.026***	Cointegrated
Botswana		
Dependent variable	**F-Statistic**	**Conclusion**
$PrvI$	5.422***	Cointegrated
Y	1.130	Not cointegrated
$PubI$	3.921**	Cointegrated
$CRED$	6.951***	Cointegrated
INT	8.580***	Cointegrated
INF	3.593*	Cointegrated
TO	3.309**	Cointegrated

Malawi						
Dependent Variable	**F-Statistic**			**Conclusion**		
$PrvI$	4.005**			Cointegrated		
Y	2.829			Not cointegrated		
$PubI$	4.422**			Cointegrated		
$CRED$	2.738			Not cointegrated		
INT	5.321***			Cointegrated		
INF	4.242**			Cointegrated		
TO	4.011**			Cointegrated		
Asymptotic critical values						
Pesaran *et al.* (2001), p.300, Table CI(iii) Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.15	4.43	2.45	3.61	2.12	3.23

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

The cointegration test results in Table 7.18 suggest that the cointegration relationship differs depending on the dependent variable used. The variables are cointegrated when the all the variables are taken as dependent variables, except for interest rate (INT) in South Africa. For Botswana, the variables are all cointegrated, except when economic growth (Y) is taken as a dependent variable. In Malawi, there is no cointegration when credit to the private sector (CRED) and economic growth are taken as the dependent variable. When the F-statistic is significant, it indicates that there is a cointegration relationship among the variables. When there is cointegration, it indicates that there is causality in at least one direction (Narayan & Smyth, 2008). The ECM-based Granger-causality test is used to obtain the direction of causality.

7.4.3.2 Results of the ECM-based Granger-causality test

After confirmation of cointegration, the causal relationship between the variables is determined by including the ECM as an additional variable in the analysis where

cointegration was confirmed. The Granger-causality is performed without an ECM for the equations where no cointegration is confirmed. The short-run causality is determined by the significance of the F-statistics, while the significance of the lagged error correction term using the t-statistics determines the long-run causality (Odhiambo, 2009).

The findings of the Granger-causality test for South Africa, Botswana and Malawi are presented in Tables 7.20 to 7.22.

Table 7.20: Results of Granger-causality tests for South Africa

Dependent variable	Short-run causality							Long-run causality
	F-statistics[Probability]							ECT_{t-1} [t-statistics]
	∆Prvl	∆Y	∆Publ	∆CRED	∆INT	∆INF	∆TO	
∆Prvl	–	8.537*** [0.010]	12.212*** [0.003]	5.208*** [0.010]	1.904 [0.186]	4.084** [0.024]	9.729*** [0.001]	-0.523*** [-5.348]
∆Y	1.185 [0.294]	–	1.089 [0.362]	0.290 [0.598]	8.768*** [0.003]	4.361** [0.021]	2.436 [0.105]	-0.263*** [-6.462]
∆Publ	8.744*** [0.007]	2.540 [0.102]	–	3.412* [0.078]	0.964 [0.337]	1.968 [0.164]	3.557** [0.046]	-0.259*** [-6.857]
∆CRED	3.528* [0.054]	1.289 [0.312]	2.544 [0.110]	–	1.382 [0.257]	5.759*** [0.007]	1.282 [0.274]	-0.875*** [-7.057]
∆INT	8.199*** [0.001]	2.945* [0.056]	0.136 [0.718]	8.042*** [0.002]	–	0.094 [0.763]	4.152** [0.037]	–
∆INF	2.965* [0.075]	1.438 [0.261]	4.575** [0.045]	4.757** [0.020]	2.093 [0.149]	–	8.095*** [0.001]	-0.582*** [-6.617]
∆TO	3.034* [0.053]	5.976*** [0.009]	0.253 [0.620]	1.753 [0.199]	1.930 [0.171]	3.781** [0.027]	–	-0.652*** [-6.763]

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Notes: ∆Prvl is Private Investment; ∆Y is Economic Growth, ∆Publ is Public Investment; ∆CRED is Credit to the Private Sector; ∆INT is Real Interest Rate; ∆INF is Inflation and ∆TO is Trade Openness.

Table 7.21: Results of Granger-causality tests for Botswana

Dependent variable	Short-run causality							Long-run Causality
	F-statistics[Probability]							ECT_{t-1} [t-statistics]
	∆Prvl	∆Y	∆Publ	∆CRED	∆INT	∆INF	∆TO	
∆Prvl	–	0.145 [0.707]	7.163*** [0.001]	7.142*** [0.004]	6.613*** [0.005]	1.010 [0.380]	4.882** [0.037]	-0.510*** [-6.918]
∆Y	2.535 [0.123]	–	0.172 [0.682]	2.858* [0.076]	0.943 [0.402]	3.854** [0.034]	7.589*** [0.003]	–
∆Publ	7.641*** [0.006]	0.872 [0.517]	–	1.568 [0.264]	2.354 [0.132]	2.998* [0.079]	3.084 [0.113]	-0.776*** [-6.764]
∆CRED	7.435*** [0.011]	8.475*** [0.001]	1.566 [0.221]	–	8.253*** [0.008]	1.385 [0.249]	1.617 [0.214]	-0.272*** [-7.663]
∆INT	0.060 [0.808]	0.465 [0.502]	5.279*** [0.006]	5.363** [0.012]	–	0.120 [0.732]	9.504*** [0.001]	-0.796*** [-8.630]
∆INF	2.474 [0.103]	2.538*** [0.010]	1.201 [0.283	2.480 [0.103]	0.161 [0.691]	–	6.740** [0.015]	-0.660*** [-5.544]
∆TO	2.601 [0.102]	2.949* [0.078]	2.968* [0.060]	6.032** [0.024	1.855 [0.173]	2.878* [0.065]	–	-0.107*** [-5.557]

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Notes: ∆Prvl is Private Investment; ∆Y is Economic Growth, ∆Publ is Public Investment; ∆CRED is Credit to the Private Sector; ∆INT is Real Interest Rate; ∆INF is Inflation and ∆TO is Trade Openness.

Table 7.22: Results of Granger-causality tests for Malawi

Dependent variable	Short-run causality							Long-run causality
	F-statistics[Probability]							ECT_{t-1} [t-statistics]
	∆PrvI	∆Y	∆PubI	∆CRED	∆INT	∆INF	∆TO	
∆PrvI	–	0.180 [0.675]	3.274** [0.029]	0.388 [0.539]	4.148* [0.053]	10.083*** [0.004]	9.741*** [0.001]	-0.427*** [-5.946]
∆Y	6.191*** [0.007]	–	0.578 [0.455]	3.818** [0.036]	3.692* [0.067]	1.186 [0.323	2.336 [0.118]	–
∆PubI	4.687** [0.042]	11.068*** [0.001]	–	4.125** [0.018]	1.432 [0.257]	0.173 [0.681]	5.200** [0.033]	-0.741*** [-6.276]
∆CRED	3.938* [0.060]	4.960*** [0.009]	1.623 [0.220]	–	2.031 [0.155]	1.709 [0.204]	0.973 [0.394]	–
∆INT	5.587** [0.026]	2.730* [0.085]	0.838 [0.444]	1.855 [0.177]	–	8.503*** [0.007]	5.387** [0.029]	-0.792*** [-6.795]
∆INF	5.810** [0.040]	2.533 [0.165]	4.032* [0.076]	3.418 [0.102]	4.018* [0.080]	–	11.267*** [0.009]	-0.773*** [-8.083]
∆TO	9.180*** [0.004]	2.786 [0.110]	7.189*** [0.009]	4.855** [0.028]	3.728* [0.054]	16.897*** [0.001]	–	-1.302*** [-7.010]

Notes: ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Notes: ∆PrvI is Private Investment; ∆Y is Economic Growth, ∆PubI is Public Investment; ∆CRED is Credit to the Private Sector; ∆INT is Real Interest Rate; ∆INF is Inflation and ∆TO is Trade Openness.

The empirical findings for the causality model show that in the short-run, there is a bidirectional causality between private investment and the following determinants: public investment, credit to the private sector, inflation rate and trade openness. There is also a unidirectional causality in South Africa from private investment to interest rate and from economic growth to private investment in the short-run. The results for Botswana show that there is bidirectional causality between private investment and the determinants, which are public investment and credit to the private sector in the short-run. In addition, there is unidirectional causality from interest rate and trade openness to private investment in the short-run for Botswana. The findings also shows that in the short-run, there is no causality between private investment and the determinants which are economic growth and inflation rate in Botswana. In Malawi, the results show that there is bidirectional causality in the short-run between private investment and the determinants, which are public investment, interest rate, inflation rate and trade openness. Other results for Malawi show that there is unidirectional causality from private investment to economic growth and credit to the private sector.

In the long-run, the findings shows that there is bidirectional causality between private investment and the determinants which are public investment, credit to the private sector, inflation rate and trade openness in South Africa. There is also a unidirectional causality in South Africa from economic growth to private investment in the long-run. In South Africa, there is no causality in the long-run between private investment and interest rate. There is bidirectional causality between private investment and the determinants, which are public investment and credit to the private sector in the long-run in Botswana. There is also a unidirectional causality from interest rate and trade openness to private investment in the long-run in Botswana. There results also reveal that in the long-run, there is no causality between private investment and the determinants which are economic growth and inflation rate in Botswana. The results for Malawi, indicate that there is bidirectional causality in the long-run between private investment and the determinants, which are public investment, interest rate, inflation rate and trade openness. Economic growth and credit to the private sector are found to have no causal relationship with private investment in the long-run in Malawi.

Other results for South Africa indicate that:

- There is bidirectional causality between interest rate and economic growth only in the short-run; credit to the private sector and inflation in the long-run and short-run; and inflation and trade openness in the short- and long-run.
- Economic growth Granger causes and trade openness, while inflation Granger causes economic growth in the short- and long-run;
- Trade openness and credit to the private sector granger causes public investment, while public investment Granger causes inflation in the short- and long-run;
- Credit to the private sector Granger causes interest rate, while trade openness Granger causes interest rate and interest rate causes economic growth in the short-run;
- Interest rate has no causal relationship with public investment and inflation; and credit to the private sector has no causal relationship with trade openness and economic growth.

Other results for Botswana indicate that:

- There is bidirectional causality between economic growth and credit to the private sector, inflation and economic growth, and trade openness and economic growth in the short-run;
- In the short- and long-run, there is bidirectional causality between credit to the private sector and interest rate, and inflation and trade openness;
- Public investment Granger causes interest rate and trade openness, while inflation Granger causes public investment and credit to the private sector causes public investment in the short- and long-run;
- There is unidirectional causality from economic growth to credit to the private sector, inflation and trade openness, and from trade openness to interest rate the short- and long-run;
- Economic growth has no causal relationship with public investment and interest rate;
- There is no causality between credit to the private sector and public investment; credit to the private sector and inflation and interest rate and inflation.

Other results for Malawi indicate that:

- In the short-run, there is bidirectional causality between economic growth and interest rate, economic growth and credit to the private sector while in the short- and long-run it is between, public investment and trade openness, interest rate and inflation, interest rate and trade openness, inflation and trade openness;
- Credit to the private sector causes public investment and trade openness in the short- and long-run;
- There is unidirectional causality from economic growth to public investment, and from public investment to inflation in the short- and long-run;
- Economic growth has no causal relationship with inflation and trade openness;
- Public investment has no causal relationship with interest rate; and there is no causality between interest rate and credit to the private sector.

7.5 SUMMARY OF RESULTS FOR ALL THE MODELS

This section summarises the results of all the three models. Table 7.23 summarises the macroeconomic determinants of domestic private investment into long- and short-run in South Africa, Botswana and Malawi.

Table 7.23 Summary of the long- and short-run determinants of domestic private investment

Variables	South Africa		Botswana		Malawi	
	Long-run	Short-run	Long-run	Short-run	Long-run	Short-run
$PrvI(-1)$		+		+		+
Y	+	+				
$PubI$	+	+		-		
$PubI(-1)$				+		-
$CRED$	+			+		
$CRED(-1)$		-				
INT			-		-	-
INF		-			-	-
TO	-	+	+	+		+

Notes: (+) is positive determinant; (-) is negative determinant.

The determinants of domestic private investment differ for each country. Although South Africa and Botswana are on the same level of development, the impact of the determinants on private investment is different. In South Africa, the macroeconomic determinants of domestic private investment in the long-run, are public investment, economic growth, credit to the private sector and trade openness, while in the short-run they are economic growth, public investment, inflation and trade openness.

In Botswana, the determinants are trade openness and interest rate in the long-run, while they are public investment and credit to the private sector in the short-run. The determinants of domestic private investment in the long-run for Malawi are interest rate and inflation. On the other hand, in the short-run, the confirmed determinants are interest rate, inflation and trade openness.

The determinants of domestic private investment and the impact seem to differ among the studied countries. The private investment of the previous year seems to have a positive and statistically significant effect on the current level of private investment in all the three countries.

Economic growth and public investment are positive determinants of domestic private investment in South Africa in both the short- and long-run. In Botswana, public investment is a negative determinant in the short-run. Trade openness in the long-run is a positive determinant for South Africa and a negative determinant for Botswana while it is a positive determinant for all the three countries in the short-run. Inflation is a negative determinant in South Africa (short-run) and Malawi (short- and long-run). Credit to the private sector is found to be a positive determinant in South Africa in the long-run, and Botswana in the short-run, while interest rate is a negative determinant in Botswana (long-run) and Malawi (short- and long-run).

Table 7.24 summarises the crowding of aggregate public investment, infrastructure and non-infrastructure public investment on private investment.

Table 7.24: Summary of crowding effect of public investment results: ARDL and NARDL approach

Impact of PubI on PrvI							
		Short-run			**Long-run**		
		South Africa	Botswana	Malawi	South Africa	Botswana	Malawi
ARDL		+	-		+		
NARDL	$PubI^{+}$		-	-		-	
	$PubI^{-}$	+	-		+	-	
Impact of PubInfr on PrvI							
		Short-run			**Long-run**		
		South Africa	Botswana	Malawi	South Africa	Botswana	Malawi
ARDL		+	-		+		
Impact of PubNonInfr on PrvI							
		Short-run			**Long-run**		
		South Africa	Botswana	Malawi	South Africa	Botswana	Malawi
ARDL		-	+		-		-

Notes: (+) is positive impact; (-) is negative impact.

The ARDL findings point out that gross public investment crowds in private investment in South Africa, while in Malawi it is insignificant in both the long- and short-run. In Botswana, private investment is crowded out by public investment in the short-run.

Regarding the nonlinear findings, in South Africa, negative shock in public investment leads to a decrease in private investment in the long- and short-run. In Botswana, the study found that a positive shock in public investment leads to a decrease in private investment, while a negative shock in public investment leads to an increase in private investment in the long- and short-run. In Malawi, a positive shock in public investment leads to a decrease in private investment in the short-run.

The infrastructure public investment in the long- and short-run has a crowding in effect on private investment in South Africa, while in Botswana, it has a crowding out effect in the short-run. Non-infrastructure public investment has a crowding out effect on private investment in South Africa and Malawi in the long-run, while in Botswana, it is statistically insignificant. In the short-run, non-infrastructure public investment has a crowding out effect in South Africa, while in Botswana, it crowd in private investment, and insignificant in Malawi.

The causal relationships between private investment and the determinants are summarised in Table 7.25.

Table 7.25: Summary of Granger-causality test for private investment in South Africa, Botswana and Malawi

Direction of causality					
South Africa		**Botswana**		**Malawi**	
Short-run	**Long-run**	**Short-run**	**Long-run**	**Short-run**	**Long-run**
PrvI ↔ PbI	PrvI ↔ PbI	PubI ↔ PrvI	PrvI ↔ PUbI	PrvI ↔ PubI	PrvI ↔ PubI
PrvI ↔ CRED	PrvI ↔ CRED	PrvI ↔ CRED	PrvI ↔ CRED	PrvI ↔ INT	PrvI ↔ INT
PrvI ↔ INF	PrvI ↔ INF	PrvI ← INT	PrvI ← INT	PrvI ↔ INF	PrvI ↔ INF
PrvI↔ TO	PrvI↔ TO	PrvI ←TO	PrvI ←TO	PrvI↔ TO	PrvI↔ TO
PrvI ←Y	PrvI ←Y	PrvI ≠ Y	PrvI ≠ Y	PrvI → Y	PrvI ≠ Y
PrvI → INT	PrvI ≠ INT	PrvI≠ INF	PrvI≠ INF	PrvI → CRED	PrvI ≠ CRED

Notes: ↔ is bidirectional causality; → and ← are unidirectional causality and ≠ is no causality.

In South Africa, the determinants of domestic private investment in the long-run, which are public investment, economic growth, trade openness and credit to the private sector, have been found to have a causal relationship with private investment, both in the short- and long-run. The determinants in the short-run, which are economic growth, public investment, inflation and trade openness, are found to have a causal relationship with private investment in both the long- and short-run. All the confirmed determinants of domestic private investment in South Africa have a bidirectional causality with private investment, except for economic growth, which has unidirectional causality running from economic growth to private investment.

In Botswana, the determinants of domestic private investment, which are trade openness and interest rate, were found to have a causal relationship with private investment, both in the long- and short-run. There is unidirectional causality from trade openness to private investment, while interest rate Granger causes private investment in the long- and short-run. In the long- and short-run, there is bidirectional causality between private and public investment, and between private investment and credit to the private sector. In Malawi, public investment, interest rate, inflation and trade openness, are found to have a bidirectional causal relationship with private investment in the long- and short-run. There is a unidirectional causality from private investment to economic growth and credit to the private sector only in the short-run.

7.6 CONCLUSION

The chapter presented and discussed the empirical findings of three models, which are (i) the determinants of domestic private investment; (ii) the crowding in or out of aggregate public investment, infrastructure and non-infrastructure public investment on private investment using the ARDL and NARDL, and (iii) the causal relationship between private investment and the determinants in South Africa, Botswana and Malawi for the period 1980 to 2018.

Using the ARDL approach, the findings from Model 1 show that in South Africa, the positive determinants of domestic private investment in the long-run are economic growth, public investment and credit to the private sector, while trade openness is a negative determinant. In the short-run, economic growth, public investment and trade openness are positive determinants, while credit to the private sector and inflation are

negative determinants for South Africa. In Botswana, trade openness is a positive determinant, while interest rate is a negative determinant of private investment in the long-run. In the short-run, public investment is a positive determinant, while credit to the private sector and trade openness are negative determinants of domestic private investment in Botswana. Interest rate and inflation are found to be negative determinants of domestic private investment in the short- and long-run for Malawi, while trade openness is a positive determinant in the short-run.

The finding from the NARDL in Model 2a indicate that in the long-run, positive shock in public investment has a negative impact on private investment in Botswana, while in South Africa and Malawi, it is statistically insignificant. The negative shock in public investment has a positive impact on private investment in Botswana, while it has a negative impact in South Africa and statistically insignificant in Malawi in the long-run. In the short-run, the negative shock in public investment has a negative impact on private investment in South Africa, and a positive impact in Botswana. The positive shock in public investment has a negative impact on private investment in the short-run in Botswana and Malawi.

The results from Model 2b reveal that infrastructure public investment crowds in private investment in both the long- and short-run for South Africa. In Botswana, infrastructure public investment has a crowding out effect on private investment in the short-run, and in Malawi, it has no statistically significant crowding effect in both the long- and short-run. However, in all the three countries, infrastructure public investment from the previous period has a crowding out effect on private investment in the short-run.

The findings from Model 2c show that the non-infrastructure public investment has a crowding out effect on private investment in South Africa and Malawi in the long-run, while in Botswana, it crowds in private investment in the short-run. In South Africa, non-infrastructure public investment also crowds out private investment in the short-run. The findings further reveal that non-infrastructure public investment in the previous period has a crowding in effect on private investment in Botswana and Malawi.

The results of the causality relationship, which was estimated in Model 3, indicate that there is a bidirectional causal relationship between private investment and public

investment in all the three countries in the long- and short-run. There is bidirectional causality between private investment and credit to the private sector in South Africa and Botswana. In South Africa and Malawi, there is a bidirectional causality between private investment and inflation; and between private investment and trade openness. There is bidirectional causality between private investment and interest rate in Malawi. Economic growth causes private investment in the long- and short-run in South Africa, while in Malawi, private investment causes economic growth, and in Botswana, there is no causality between the two variables. In Botswana, interest rate and trade openness causes private investment in both the long- and short-run, while in South Africa, the causality runs from private investment to interest rate in the short-run. There is no causality between private investment and inflation in both the long- and short-run in Botswana, while in Malawi, private investment causes credit to the private sector in the short-run.

CHAPTER 8

CONCLUSIONS AND POLICY IMPLICATIONS

8.1 INTRODUCTION

This chapter summarises the study and its findings, before concluding and providing recommendations based on the empirical findings. The chapter is arranged as follows: Section 8.2 presents a brief summary of the study. Section 8.3 discusses the key empirical findings of the study, while the conclusions and policy recommendations are presented in Section 8.4. Lastly, Section 8.5 presents the possible limitations of the study and identifies areas where further research can be conducted.

8.2 SUMMARY OF THE STUDY

The study examined the macroeconomic determinants of domestic private investment in South Africa, Botswana and Malawi, using annual data from 1980 to 2018. To achieve the main objective of the study, the following specific objectives were pursued for the selected countries in the study:

1. Empirically investigate the main short- and long-run macroeconomic determinants of domestic private investment in the three Southern African countries.
2. Empirically examine the linear and nonlinear crowding effects of gross public investment on private investment in the short- and long-run.
3. Empirically examine the crowding effects of infrastructure public investment and non-infrastructure public investment on private investment for each country in the short- and long-run.
4. Empirically examine the direction of causality between domestic private investment and its determinants in the three countries in the short- and long-run.

The study also reviewed the relevant policies encouraging private investment for each study country. The policies that were reviewed for South Africa include the Reconstruction and Development Programme (RDP), the Growth, Employment and Redistribution strategy (GEAR), the Accelerated and Shared Growth Initiative for South Africa (AsgiSA), and the latest, the National Development Plan (NDP). The

government also planned to boost the involvement of the private sector in the economy through the privatisation process of the SOEs.

In Botswana, the policies that were reviewed include the Public Private Partnerships (PPP), the privatisation of SOEs, and other initiatives outlined in the National Development Plant (NDP) version 11, which include local economic development, special economic zones, cluster development and beneficiation.

In Malawi, the policies include the privatisation of SOEs, the Malawi Growth and Development Strategy (MGDS) version I, and MGDS II and MGDS III. The Malawian government has also developed policies for the privatisation of SOEs, as a way to involve the private sector in the economy, as in the case of South Africa and Botswana.

The theoretical and empirical literature on private investment, which informed the empirical models employed in the study, were also reviewed. The theories that were reviewed include the Accelerator theory of investment, the Neoclassical theory and the Q-theory of investment.

The study employed the ARDL model, the NARDL approach and multivariate Granger-causality. To use the ARDL approach, the variables were first tested for stationarity to ensure that all the variables in the study are not integrated of an order of two or higher. The following unit roots tests, namely, the ADF, DF-GLS, and the PP test were used to test for stationarity. The Zivot-Andrews structural break unit root test was also used to test the variables for stationarity. Before estimating the NARDL, all the variables were tested for nonlinearity using the BDS test.

The study estimated three models for South Africa, Botswana and Malawi, respectively. Using the ARDL approach, Model 1 examined the determinants of domestic private investment, and included the following explanatory variables: economic growth, public investment, domestic credit to the private sector, inflation, real interest rate and trade openness. Model 2a examined the impact of gross public investment on private investment, using the ARDL and NARDL. Model 2b examined the crowding effect of disaggregated public investment into infrastructure and non-infrastructure on private investment, using the ARDL approach. Model 3 examined the causal relationship between domestic private investment and its determinants, using the multivariate Granger-causality.

8.3 SUMMARY OF THE EMPIRICAL FINDINGS OF THE STUDY

The empirical findings in South Africa, Botswana and Malawi for all the three models in the study revealed the following:

1. In Model 1, as expected, in terms of South Africa, it was established that economic growth is a positive determinant of private investment in both the short- and the long-run. These findings concur with Ghura and Goodwin (2000), Erden and Holcombe (2006), Adugna (2013), Michael and Aikaeli (2014), and Ngoma *et al.* (2019), among others. However, in terms of Botswana and Malawi, no statistically significant effect was found in both the long- and short-run. Studies, such as those of Erden and Holcombe (2006), and Bint-e-Ajaz and Ellahi (2012), found GDP to have an insignificant influence on private investment.

   Regarding public investment, it was found to be a positive determinant of private investment in both the long- and short-run in South Africa, while in Botswana, it is a negative determinant in the short-run, and it is statistically insignificant in the long- and short-run in Malawi. The positive results are similar to those of Ribeiro and Teixeira (2001), Ang (2009), and Ayeni (2020), and the negative results are similar to those of Karagöl (2004) and Lesotlho (2006), while studies such as those of Karagoz (2010) have found public investment to be insignificant in determining private investment.

   Regarding domestic credit to the private sector, was found to be a positive determinant of private investment in the long-run for South Africa, and in the short-run, for Botswana, as expected. However, in Malawi, it is statistically insignificant in both the short- and the long-run. Studies that have found similar results as those for South Africa and Botswana include the studies of Asante (2000) and Ayeni (2020), among others.

   On the one hand, in Malawi, real interest rate and inflation are the negative determinants of domestic private investment in the short- or long-run. The findings are in accord with, Valadkhani (2004), Suhendra and Anwar (2014), and Akçay and Karasoy (2020), among others. On the other hand, in Botswana, real interest rate is a negative determinant of private investment, only in the long-run, while it is statistically insignificant in South Africa, both in the short- and long-run. Studies, such as those of Ribeiro and Teixeira (2001), and Karagoz (2010) found

interest rate to be insignificant. In the short-run, the inflation is a negative determinant for South Africa, while it is statistically insignificant for Botswana in both the long- and short-run. Lesotlho (2006) also established that inflation has no significant determination of private investment in Botswana.

Trade openness is a negative determinant in South Africa. In Botswana, trade openness is a positive determinant of private investment, as expected in the long-run. In the short-run, trade openness is a positive determinant in all the three countries. These results follow the findings of similar studies, such as those of Ambachew (2010), and Ajide and Lawanson (2012). In South Africa, Botswana and Malawi, lagged private investment is found to be a positive determinant of private investment in the short-run.

2. In Model 2a, it was found that public investment crowds in private investment in South Africa, while in Malawi there is no statistically significant crowding effect in both the long- and short-run. In Botswana, it is found that public investment crowds out private investment in the short-run. Furthermore, the long-run results of the NARDL model show that positive shock in public investment has a negative and statistically significant effect on private investment, which means that it will lead to a decrease in private investment in Botswana. The negative shock in public investment leads to an increase in private investment in Botswana and a decrease in South Africa in the long-run.

   In the short-run, the negative shock in public investment leads to a decrease in private investment in South Africa and an increase in private investment in Botswana. The positive shock in public investment has a negative impact on private investment in Botswana and Malawi. Therefore, positive shock in public investment leads to a decrease in private investment in the short-run in Botswana and Malawi.

   In Model 2b, the study found that private investment is crowded in by infrastructure public investment in South Africa in both the long- and short-run. Sakr (1993) found that public infrastructure investment is positively related to private investment. In Botswana, infrastructure public investment crowds out private investment in both the short-run.

In Model 2c, the study found that non-infrastructure public investment crowds out private investment in South Africa in both the long- and short-run. The findings are consistent with that of Sakr (1993) and Odedokun (1997). In Botswana, non-infrastructure public investment crowds in private investment in the short-run, while in the long-run, it has no statistically significant crowding effect. In Malawi, non-infrastructure public investment has a crowding out effect on private investment in the long-run, but in the short-run, it has no statistically significant crowding effect.

3. In Model 3, the causality results revealed that there is bidirectional causality between private and public investment in both the short- and long-run in all the three countries in the study. In the short- and long-run, there is bidirectional causality between private investment and credit to the private sector in South Africa and Botswana. In both the short- and long-run, there is a bidirectional causality between inflation and private investment, and private investment and trade openness in South Africa and Malawi. In both the short- and long-run, there is bidirectional causality between private investment and real interest rate in Malawi. Private investment Granger causes economic growth and credit to the private sector in the short-run, and no causality in the long-run in Malawi. In Botswana, there is unidirectional causality from interest rate and trade openness to private investment in the short- and long-run. In South Africa, there is unidirectional causality running from private investment to interest rate in the short-run, while there is no causality in the long-run and unidirectional causality running from economic growth to private investment in both short- and long-run. In Botswana, there is no causal relationship between private investment and economic growth and between private investment and inflation in the short- and long-run.

4. Based on the results of the determinants in the model study, the hypothesis that the short- and long-run macroeconomic determinants of domestic private investment are public investment, economic growth, domestic credit to the private sector, the real interest rate, inflation and trade openness in South Africa, Botswana and Malawi is accepted. However, the determinants are different for each country. The hypothesis that there are nonlinear crowding effects of gross public investment on private investment in the short- and long-run is accepted in

all the three countries (South Africa and Botswana, both in the short- and long-run and Malawi, only in the short-run). The hypothesis that infrastructure public investment crowds in private investment is accepted in South Africa in both the short- and long-run. The crowding out of non-infrastructure public investment on private investment is accepted in South Africa and Malawi (South Africa in both the short- and long-run, and in Malawi only in the long-run). Regarding the causality findings, the direction of causality differs from one country to another for some of the determinants. However, the main finding is that there is a bidirectional causal relationship between domestic private investment and its determinants in all the three countries.

8.4 CONCLUSIONS AND POLICY RECOMMENDATIONS

The study concludes and suggests policy recommendations based on the results of the study as follows:

1. The study suggests that the determinants of domestic private investment are not the same in South Africa, Botswana and Malawi. Unlike in Botswana and Malawi, economic growth is found to be a positive determinant of private investment only in South Africa. As a result, it is recommended that policy-makers in South Africa develop policies and strategies that promote the growth of the economy to encourage investment from both local and foreign private investors into the country. As it has been found that public investment is a positive determinant of private investment, the study recommends that the government should adopt fiscal policies that focus more on government investment, especially, on infrastructure development and that reduce government consumption. They furthermore, need to create a favourable environment for the private sector by making it easier to obtain capital or credit from financial institutions.

   Domestic credit to the private sector has been found to be a positive determinant in South Africa and Botswana. Hence, the study recommends that the governments of these two countries should develop policies that focus on making it easier for the private sector to get credit from the lending institutions by offering lower borrowing rates for investment in sectors that can create jobs and boost economic growth. The government in South Africa and Botswana, should

develop a policy to act as a guarantee for loans provided to small businesses that do not have assets for security against the loan.

Real interest rate is found to be a negative determinant of private investment in Malawi and Botswana. As a result, the study recommends that the governments of Botswana and Malawi adopt monetary policies that ensure that interest rates are kept low to promote investment. Low interest rates can encourage investment, as it can become cheaper for investors to borrow money to finance their businesses. Through the incentives, the governments should continue to provide financial assistance by offering loans at low or no interest rate for investment in certain sectors.

In Malawi and South Africa, inflation was found to be a negative determinant of private investment, therefore, the study further recommends that the governments of these two countries should reduce inflation through supply-side policies. In order to increase the supply of goods and services in the market which will lead to a decrease in prices, the governments may also have policies that will enable an open market that can ensure more competition.

As trade openness is found to be a positive determinant of private investment in the short-run for all the three countries, the study recommends that the trade policies in South Africa, Botswana and Malawi should focus on reducing or removing the tariffs applying to other countries, which can make it easier for local businesses to export their goods and services, and also to import machinery and equipment that they utilise in the production of goods and services. The countries need to form partnerships and explore new opportunities through the African Continental Free Trade Area (AfCFTA).

2. The results on the crowding effect of public investment on private investment differ from country to country. The positive shock in public investment has a negative impact on private investment in Botswana and Malawi, while in South Africa, it has no statistically significant impact in the short-run. In the long-run, positive shock in public investment has a negative impact in Botswana. The negative shock in public investment has a positive impact on private investment in Botswana and a negative impact in South Africa in the long- and short-run. This implies that the government should consider adopting policies that can

stimulate private investment and that cannot compete with the private sector in order to crowd in private investment. Given the asymmetrical relationship between public and private investment, the government should formulate policies in such a way that they will be able to promote private investment, irrespective of the shocks in the economy.

The study also suggests that the crowding effects of infrastructure public investment and non-infrastructure public investment on private investment are not the same for South Africa, Botswana and Malawi. Infrastructure public investment crowds in private investment in both the long- and short-run in South Africa. In Botswana, it has a negative impact in the short-run, while it has no statistically significant effect in Malawi in the long- and short-run. The recommendation is for the government to invest more in infrastructure, roads and technology in South Africa to make it easier for the private sector to invest more in the country. In Botswana, it is recommended that the government should invest more in infrastructure that stimulate more investment by the private sector. In Malawi, there is no need to develop policies that can lead to an increase or decrease of infrastructure public investment, as it is statistically insignificant.

Since non-infrastructure public investment in Botswana crowds in private investment in the short-run, the government should spend more on non-infrastructure public investment and formulate more initiatives to promote the role of the private sector in growing the economy. For South Africa and Malawi, where it crowds out private investment in the long-run, the government can adopt policies that will ensure that the spending by government on non-infrastructure investment complements the private sector investment.

3. In terms of the causality results, it was found that economic growth has no causal relationship with private investment in Botswana, which implies that the growth of the economy may not lead to an increase in the level of private investment. Therefore, policies that will ensure that the growth of the economy achieve a higher level of private investment have to be formulated. However, the study found that private investment causes economic growth in Malawi in the short-run. Therefore, the study recommends that that the Malawian government should continue to create a conducive environment for the private sector, to achieve a higher economic growth. In South Africa, economic growth causes private

investment, which suggests that the growth expansion of the economy translates into more investment by the private sector. The results also suggest that most of the determinants have a causal relationship with domestic private investment. Thus, for all the three countries, the study therefore recommends that policy-makers formulate policies that will create a conducive environment that can stimulate domestic private investment in the economy, such as easy access to finance, openness of the economy, and low and stable inflation rate.

8.5 LIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH

Even though significant efforts have been made to ensure that the findings of the study are credible and reliable, the study may have limitations, similar to many scientific research studies. Firstly, the study was limited to the period from 1980 to 2018 due to lack of adequate and reliable data and also did not include all the macroeconomic variables that could be potential determinants of domestic private investment. However, other macroeconomic variables could be included in the future studies. As the data related to these omitted variables becomes available, it would be ideal for future studies to investigate and establish if the findings would be different from the findings of the current study. Future studies could also consider a different time period, and observe if the findings would be different.

Secondly, the study examined the macroeconomic determinants of domestic private investment, using the aggregate private investment. However, the macroeconomic determinants could have different effects on the different sectors of the economy. Therefore, future studies could examine the determinants of disaggregated private investment into different sectors, such as manufacturing, construction, technology, and so forth.

Thirdly, some variables that have been included in the study, such as interest rate and inflation rate, are volatile in nature, and the linear ARDL model which was used to examine the determinants in this study, does not capture the asymmetric relationship between the variables and private investment. Therefore, future studies can use the NARDL model to establish the short- and long-run determinants of domestic private investment, and compare the findings with that of the ARDL approach.

Although the limitations presented here could have affected the empirical findings of the study to some extent, it is assumed that the effects are minimal, and the results of the study remain valid.

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