THE EFFECT OF FOREIGN DEBT SERVICE ON PUBLIC INVESTMENT IN MALAWI

MASTER OF ARTS (ECONOMICS) THESIS

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UNIVERSITY OF MALAWI
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MASTER OF ARTS (ECONOMICS) THESIS

By

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DECLARATION

I, the undersigned, hereby declare that this dissertation is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used, acknowledgements have been made.

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Signature

3 September 2018
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Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

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Second Supervisor

DEDICATION

To my late Grandfather, Mr. Leonard Whiteman Botha

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ABSTRACT

Foreign debt has been one of the major ways through which Malawi has financed various development projects and fiscal deficits. Despite debt relief in 2006 through the HIPC and MDRI schemes, statistics show that the foreign debt stock has been on the increase, standing at 33% of GDP as of 2017 from 15% of GDP right after debt relief. High levels of debt stock subsequently imply high levels of debt service spread across the years to come. Various authors have argued that foreign debt service may have negative implications on an economy; however, their arguments were based on middle and high-income countries whose debt was not concessional. This study investigated if foreign debt service influenced the level of public investment in Malawi, a low-income country. The study used annual data from 1976 to 2015 and an ARDL model to estimate the relationship between public investment and foreign debt service along with other covariates. The results show that a statistically significant negative long-run relationship exists between foreign debt service and public investment in Malawi. This implies that, despite a large proportion of Malawi's debt being concessional, its debt service crowds out initiatives to improve the country's productive capacity through public investment.

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LIST OF ACRONYMS

ARDL	Autoregressive Distributed Lag
CMR-IO	Clemente Montanes Reyes – Innovation Outliers
ECF	Extended Credit Facility
EU	European Union
EIB	European Investment Bank
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
HIPC	Highly Indebted Poor Countries
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
MDRI	Multilateral Debt Relief Initiative
OPEC	Organization of the Petroleum Exporting Countries
PRGT	Poverty Reduction Growth Trust
SSA	Sub-Saharan Africa
VAR	Vector Autoregression

CHAPTER ONE

INTRODUCTION

1.1 Background

Malawi, just like most countries of the world recurrently borrows both domestically and externally to finance annual domestic financial budgets and implement other developmental projects. The notion of foreign debt is not only limited to underdeveloped or developing countries, but also applies to large economies such as France and Germany who also have high levels of debt stock. The Dual Gap theory (Chenery & Strout, 1966) asserts that external financing is a conducive tool for sustainable development than domestic financing when, savings rates are low (Abdullahi, Bakar, & Hassan, 2016). Thus, since underdeveloped countries have very low savings rates and are unable to adequately finance investment; foreign debt becomes a necessary tool because it allows developing countries to invest more than they can save domestically (McKinnon, 1964). The Financing Gap theory also asserts the same and it puts forth the argument that; just as in the stages of development as coined by Rostow (1960), developing countries need high levels of investment for the "take-off" stage which is fulfilled by external financing if the developing country does not have enough resources. Over the years, Malawi has been experiencing recurrent fiscal deficits. Figure 1 shows an overview of revenues, expenditures and government deficit as a percentage of GDP over the past few years. As depicted in the figure, fiscal deficit has averaged about 5% of total GDP showing evidence of high fiscal deficit over the time period. This problem has been exacerbated in the recent years

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due to donor abandonment, which left the country to run on zero-deficit budgets in the 2011/2012, 2014/2015 and 2015/2016 fiscal years. These fiscal deficits have several implications on economic development. One major consequence is that this leads to financing of only a few selected sectors while other sectors of the economy remain unfunded. While measures to increase revenue[1] have been pursued, the country has had to resort to both domestic and foreign debt to finance various activities in the economy.
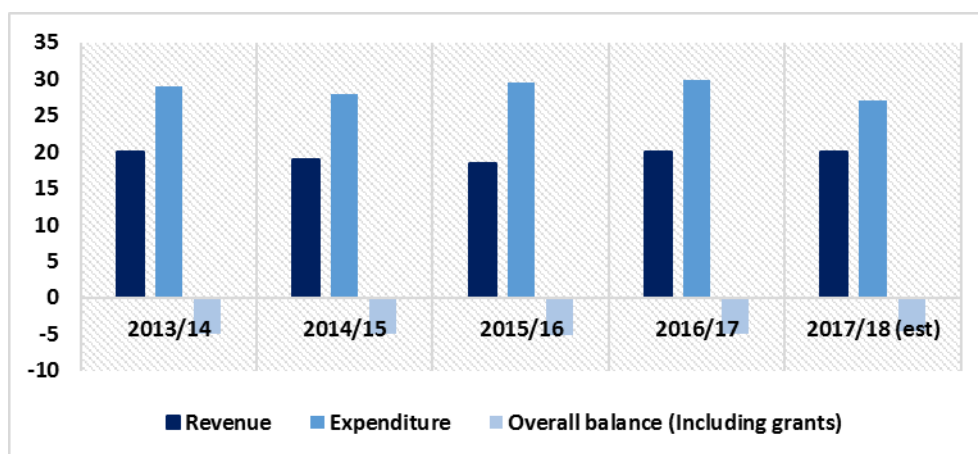
Figure 1: Malawi's trend in revenue, expenditure and budget deficit (% of GDP)
Adapted from Malawi Economic Monitor (2017)

The use of debt in an economy is justified for various reasons. Historically, the world debt crisis originated from the oil crisis of the 1970s where there was a drastic increase in oil prices by the Organization of Petroleum Countries (OPEC). Countries with current account deficits sourced funds from international banks to address their current account problems (Todaro & Smith, 2008; Thirlwall, 1989). When the problem persisted, countries also used debt for financing other activities in the economy including infrastructure development. As argued by Chenery and Strout

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[1] Such as increased tax rates, export diversification etc.

(1966), foreign debt was mostly used to finance investment projects in countries with low savings rates like Malawi[2].

Economic literature asserts that higher levels of debt translate into economic growth. However, the empirical literature on this relationship has been inconclusive as foreign debt has had negative or no implications on economic growth in some cases (Munzara et al., 2015; Were, 2001; Iyoha 1996). Despite the mixed results, what remains inevitable is the fact that both current and future generations service the debts and in some cases with interest. Debt service is accounted for as part of annual government expenditure and rising debt levels imply that the government will have to devote a significant amount of revenue repaying it at the cost of important local investment (Easterly & Schmidt-Hebbel, 1993). Over the years, Malawi has devoted a lot of finances to service debt. Figure 2 shows an overview of debt service over time. As shown in the graph, foreign debt service peaked in the year 1986 but overall there has been volatility in the annual levels. After the HIPC and MDRI debt relief, an increasing trend in debt service is evident with a $60 million level in the year 2014.
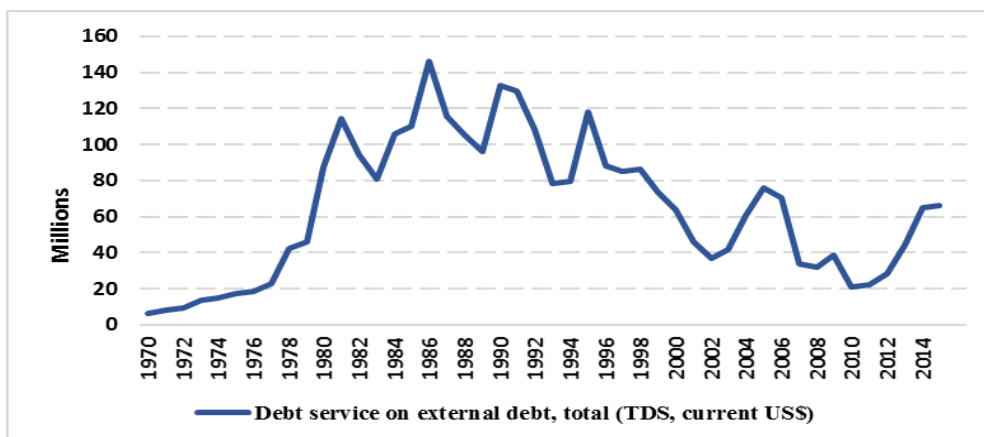
Figure 2: Trend in Debt service

Source: World Bank Statistics

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[2] As of 2017, the savings rate in Malawi stands at 5.6% (Reserve Bank of Malawi, 2017), a level below the minimum savings rate of 12% required for poverty reduction.

1.2 Problem statement

As earlier postulated, increased levels of debt stock lead to an increased burden of debt service in the long run. This in turn influences the government's spending patterns as more financial resources are devoted to service debts and immediate consumption expenditures. One major sector affected by these actions is the public investment sector. Public investment constitutes investment that is only financed from the government budget, both at subnational and central level (Mehrota & Valila, 2007). It constitutes, an economy's initiatives on projects whose gain is mostly realized in the long run. Malawi's annual budget faces high competition for financial resources as evidenced from the recurrent fiscal deficits over the years (Figure 1). According to the Debt Overhang literature (Krugman, 1988), debt service has the potential to crowd out investment in a country. Other researchers such as Fosu (2010), Iyoha (1996) and Cohen (1993) have also supported this hypothesis empirically in various countries, nevertheless, their debt was highly non-concessional[3]. However, in the case of Malawi, it is unknown whether debt service has an influence on public investment in Malawi. That is, despite the continued rise of debt to 33% of GDP in the country, no study has ascertained whether the cost to all the debt acquired through debt service has negative implications on the growth of capital formation in the country.

1.3 Objectives

The underlying objective of this study is to examine the long run relationship between foreign debt service and public investment in Malawi. The specific objectives are as follows:

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3 Concessional debt is defined as debt with very low or zero interest rate; long-term maturity period and a grant element (World Bank, 2017)

i. To assess whether in the long run, debt service influences public investment in Malawi

ii. To assess the dynamic response of public investment to changes in the level of debt servicing obligations.

1.4 Test Hypotheses

To examine the objectives outlined, the study investigated the following hypotheses:

i. There is no long run relationship between foreign debt service and public investment in Malawi.

ii. There is no dynamic response of public investment given a change in debt servicing obligations.

1.5 Significance of the study

Information on whether servicing debts has implications on public investment is very important. This is because, since the HIPC and MDRI debt relief schemes, the country has once more started to accumulate foreign debt as evidenced from the rise in debt-to-GDP ratio to 33% as of 2016 from the 15% level soon after debt relief and subsequently an increase in debt service from as low as 1.7% in 2010 to 12% of exports (excluding grants) in 2017. This is worrisome because the cost to debt service gets higher as more debt is accumulated. Thus, analyzing whether debt service influences public investment has vital policy implications for planning of a sustainable economic system through capital formation.

In addition, public investment has an impact on the success of private investment in an economy. That is as public investment advances, a conducive environment for

private investment is created. Makuyana and Odhiambo (2014), Chand and Kumar (2004) Munnell (1990), and Ashcauer (1989a), (1989b) have argued that public investment expenditure on basic infrastructure, such as transport, communication, water systems, health and education promote economic growth indirectly through increasing private sector productivity, thus attracting private capital formation. It is also argued that an increase in public investment increases the country's productive capacity which in turn contributes to increased national income capacity (Agenor & Montiel, 2008). This study is therefore important because it unveils the extent to which debt service influences investment in Malawi.

1.6 Organization of the Paper

This chapter has given the background information to the study. Chapter Two presents an overview of the debt situation and public investment in Malawi. Chapter Three provides the literature review, comprising of both the theoretical and empirical literature. Chapter Four presents the methodology, specifically defining the analytical framework, model specification, measurement of variables, stationarity tests and diagnostic tests conducted in the study. Chapter Five presents the results and discusses the findings. Finally, Chapter Six concludes the study.

CHAPTER TWO

OVERVIEW OF DEBT SITUATION AND PUBLIC INVESTMENT IN MALAWI

2.1 Introduction

This chapter provides a description of the debt situation in Malawi over time, providing a description of the country's major creditors as well as the institutional frameworks underlying Malawi's debt agreements. The chapter also provides an overview of public investment in Malawi.

2.2 Historical Perspective of Foreign Debt in Malawi

Malawi's trend in public external debt dates to the period after independence (1970s). By then, the ruling administration mainly obtained foreign debt to supplement low domestic savings rates; to address foreign exchange shortages and balance of payment problems in the country. In general, the most important reason for acquiring these debts was to meet the country's development needs at the time through infrastructure development, agriculture, health and education. Figure 2 shows the trend in foreign debt stock dating from the 1970s. There was a significantly larger upsurge in foreign debt in the period post the 1990s. During this period, Iyoha (1999) notices that most of the SSA countries also experienced an increase in debt stock and went further to attribute this to several factors such as uncontrolled fluctuations in export earnings, continued decline in terms of trade, realignment of exchange rates as well as high interest rates.

Figure 3: Historical trend in foreign debt stock

Source: World Bank Statistics (2018)

In the case of Malawi, several factors may have contributed to this relatively larger upsurge in debt stock. Apart from the usual use of debt for balance of payment problems, the country was hit by drought and subsequently floods in the period between 1992 and 1994. These shocks eventually led to poor performance of the agricultural sector resulting to deficits due to high maize imports. In addition, the Centre for Social Concern (2012) argued that this upsurge was due to poor management of prior debts attributable to a weak debt contraction and oversight mechanism that was prevalent at the time[4]. Tchereni et. al. (2013) further argued that the rapid increase in debt stock was due to the fact that Malawi as a net importer required a lot of foreign currency which it partly sourced through the foreign debts. They further argued that since the country's focus was on poverty reduction, foreign debt was required for pro-poor initiatives such as building school blocks, clinics, water and sanitary facilities.

Despite being a member of HIPC since the period before 1996, Malawi only qualified for the HIPC debt relief scheme in 1999. During this year, the country's foreign debt stock was estimated at $2, 608 million in nominal terms, including $17.4 million in

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[4] By this time, the Public Finance Management Act had not yet been enacted

arrears. The total debt at the decision point was estimated at $1,482 million in net present value terms, equivalent to around 82 % of GDP, 269 % of exports of goods and non-factor services, and 516 % of government revenues at the time (Mwanakate & Bhatia, 2017). However, by 2005, Malawi's foreign debt was 104% of GDP, a spectacle which showed that the country's debt had reached unsustainable levels. Table 1 shows Malawi's creditors and the respective nominal values of debt stock (in millions of US Dollars) at the point when the decision to grant debt relief was made. As depicted, the highest debt stock was with multilateral creditors followed by bilateral creditors in which Japan had the highest stake. Commercial creditors constituted the lowest share in the total foreign debt.

Table 1: Malawi's creditors at decision point for HIPC debt relief (1999)

Creditor	Nominal Debt Stock (Millions of Dollars)
Multilateral	**2, 187.1**
World Bank/IDA	1, 603.0
IMF	87.6
African Development Bank Group	321.7
EU/EIB	95.5
Other Multilaterals	79.3
Paris Club Bilateral	**337.8**
Non-Paris Club Bilateral	**43.4**
Commercial	**36.0**
Total	**2, 604.3**

Source: IMF/IDA (1999)

As of 2006, Malawi saw debt cancellation of US $3.2 billion: US$ 1.62 billion through the HIPC scheme and US$ 1.58 billion through the MDRI scheme in nominal terms (Killian, 2014). About 88.4% of the debt cancelled was payable to multilateral

creditors; 11.5% to bilateral creditors and the 0.1% payable to commercial creditors was not cancelled (Centre for Social Concern, 2012). Malawi paid US$ 90 million in arrears to its creditors before receiving the relief. The overall debt cancellation led to a decrease in total foreign debt stock from 104% to about 14.2% of GDP as of end 2006 (Afrodad, 2017).

The country could now save about US$ 115 million each year post 2006. This gave the country an opportunity to engage in development projects and poverty reduction initiatives through the three Protected Priority Expenditures (PPEs); Agriculture and Food Security, Health and Education at the time.

However, the country's debt stock once again started to increase rapidly in comparison to some of the SSA countries who also had debt relief in 2006. These countries include Ghana, Mozambique, Niger, São Tomé and Príncipe, Senegal, Uganda, and Zambia. Most of these countries also experienced rapid growth in their levels of debt nevertheless, the IMF's debt sustainability analysis found that Malawi's debt was significantly above the median debt levels of its fellow sub-Saharan African countries. As of 2012, Malawi's total foreign debt was US$ 1.108 billion and Centre for Social Concern attributed this rapid growth to the increase in transport and agricultural input cost; and the country's inability to compete at world markets. In addition, it has also been argued that the upsurge in debt stock during this period was indirectly due to the aftermath of the world financial crisis, but there has been no evidence to qualify this claim.

More recent statistics have continued to show an increase in foreign debt accumulation. As of 2016, the total foreign debt stock stood at 33% of GDP and the IMF characterized this as one of the fastest paces of debt accumulation amongst the HIPC and MDRI debt relief recipients (IMF, 2017). The IMF's debt sustainability analysis for the year 2017 categorized Malawi's foreign debt as sustainable, nevertheless, it was quick to mention that if careful management was not employed, the debt stock would approach the levels that were prevalent before the HIPC relief scheme. Mwanakate and Bhatia (2017) also argued that this upsurge in foreign debt stock had been encouraged by an increase in public financing needs which are partly met through foreign debt from non-traditional creditors such as China and India.

Table 2 shows the composition of Malawi's foreign creditors as of June 2017. As depicted, multilateral creditors continued to have the highest share (76%) followed by bilateral creditors. Malawi currently does not have any debt from commercial creditors.

Table 2: Malawi's Foreign Creditors (2017)

Creditors	Actual debt value (Millions of Dollars)	Share (%)
Multilateral	**1,362.34**	**76.17**
IMF	206.00	11.52
IDA	642.21	35.91
ADF	247.91	13.86
IFAD	72.49	4.05
Other multilateral and PTA	193.66	10.83
Bilateral	**426.23**	**23.83**
Belgium	1.65	0.09
China	226.90	12.69
India	147.29	8.23
Others	50.40	2.82
Commercial	**0.00**	**0.00**
Total	**1,788.57**	**100.00**

Adapted from IMF: Malawi Debt Sustainability Analysis, 2017.

2.3 Institutional Framework for Debt Acquisition

Loan acquisition in Malawi is governed by a clearly stipulated legal and policy framework. The Constitution of Malawi states that a loan may be raised by the government under the authority of an act of parliament and not otherwise (Constitution of Malawi, Section 180). Furthermore, parliament has the mandate to authorize a loan; to direct the proceeds of the loan to their intended purposes and to authorize payment of these proceeds out of the Consolidated Fund[5] under this act. According to the Public Finance Management Act (2003), the Cabinet is responsible for determining the particulars of the loan such as the price of securities, dates of repayment, interest rates, dates from which interest rates are to be computed from, amount of the loan within limits of the authorizing Act, whether or not to accept

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[5] This is where all revenues or other moneys raised or received for the purposes of the Government subject to the Constitution and any Act of Parliament are paid into (Constitution of Malawi, section 172)

excess amount of loan within limits of the authorizing act, and any other special conditions which apply to the loan. The Public Audit Act also mandates the Auditor General to monitor all public funds and make sure they follow the laws of Malawi.

Despite all these comprehensive loan governing tools, Centre for Social Concern (2012) and Kumbatira (2011) have expressed worries on the implementation of the above framework. This is because the Cabinet has so far only authorized the loans and not debated them. This is evidenced from the fact that no loan bill has ever been rejected in parliament. A number of members of the national assembly have also expressed dissatisfaction citing that they lacked detailed information on the loans that were being contracted and therefore did not have enough time to understand and consult on the loan facility which needed approval. This is contrary to the stipulations according to the National Assembly Standing Orders which specifies that the Minister in charge of a bill ought to give out all relevant information to all members of the national assembly at least 28 days before the bill is first read in Parliament.

2.4 Debt Service Framework

The debt service framework for most of Malawi's creditors is somewhat the same. Most of the debt is repaid over a long period of time with very low charges.

Multilateral debt constitutes the largest share of the total foreign debt as depicted in Table 2 earlier. All the debt from these sources is concessional[6] and debt service entails annual and semi-annual payments of the debt as per agreement with the creditors. As for the International Development Association's (IDA) development credits, a service fee of 0.75% is charged on the principal amounts withdrawn and

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[6] this is debt with very low or zero interest rate; long-term maturity period and a grant element

outstanding. A commitment charge of 0.3% which begins to accrue 60 days after the credit agreement is signed was approved for the 2006 financial year. The IDA development credits are free of interest and repayments can be spread over 25 to 40 years, including a grace period of 5 to 10-years (World Bank, 2017).

Loans from the African Development Fund have a front-end fee of 0.25% of the loan amount due at loan effectiveness; a commitment fee of 0.25% of the undisbursed amount per annum; and a maturity premium of 0.1% if the average loan maturity is between 12.47 and 15 years and 0.2% if the average loan maturity is above 15 years (African Development Bank, 2018).

Financial assistance from the IMF is implemented in Malawi through the Extended Credit Facilities (ECF). The ECF was created under the Poverty Reduction Growth Trust (PRGT) as part of a wider reform to improve the IMF's support in low income countries). Loans from the IMF carry a service charge of 0.5%. These loans are also free of interest, with 5.5 year grace period and maturity of 10 years (IMF, 2017).

Debt from the IFAD is also free of interest and consists of a 0.75% service charge per annum. Maturity period of the loans here is 40 years including a grace period of 10 years (IFAD, 2012).

Out of the bilateral creditors, China has the highest stake with a share of about 13% of the total foreign debt in the country. The terms to China's loans are marginally concessional in comparison to loans offered by multilateral creditors (Foster et al, 2009).

2.5 Public Investment in Malawi

Investment in Malawi has been largely dominated by public investment. Figure 4 provides an overview of total public investment (gross fixed capital formation) in Malawi. Public capital formation was higher than private capital formation in the period after 1965 because the Malawi government adopted a strong market intervention approach after independence. During the time, the government sought to address the infrastructural gaps which had been neglected during colonial rule in the country. This included sectors such as transport, communication, agriculture, housing, education and health. In addition, public investment was also high during this time because of the absence of adequate private capital to fund such infrastructural projects (Makuyana & Odhiambo, 2017).
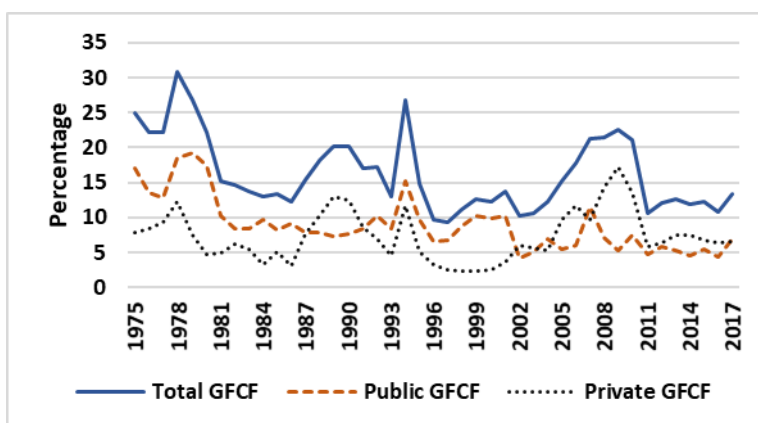
Figure 4: Trend in Investment in Malawi

Source: World Bank statics

The introduction of the SAPs refocused the government's role in investment to core infrastructures that were aimed at stimulating growth in the private sector. This included investment in education, health, transport, water, power generation and transmission. As observed in figure 4, private investment started to dominate total investment. There have since been variations in the total share of public investment in

total investment over the years, with private investment dominating the total investment in some instances.

The key country strategy papers developed after 2004 such as the Malawi Economic Growth Strategy (2004) and the Malawi Growth and Development Strategies I and II (2006-2016) have also supported this stance in government intervention as they identify government as the key stakeholder in infrastructural investment aimed at promoting private capital growth.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter reviews both the theoretical and empirical literature on foreign debt, debt overhang, economic growth and public investment.

3.2 Theoretical Literature

Theoretical literature on the relationship between foreign debt and economic growth has mostly focused on the negative effects of debt acquisition through debt overhang. Nevertheless, Solow (1956) provides a starting point by developing a growth model and postulates that an expansion in the level of investment spurs economic growth in an economy. Based on this theory, foreign debt has direct positive effects on economic growth because if the borrowed funds are used optimally, an increase in investment will result. However, a large proportion of the theoretical literature on debt has argued that debt also has an indirect effect on investment whereby it reduces the resources for investment through debt service. This constitutes the debt overhang hypothesis which argues that foreign debt has a direct positive effect on economic growth until a certain threshold, where additional debt has negative implications on the growth of the economy. This is discussed further in the next section of this chapter.

3.2.1 The Debt-Overhang Theory

The debt overhang theory was originally introduced by Myers (1977) where his applications were in corporate finance. The theory was however first applied in development economics by Cohen and Sachs (1986) and Krugman (1988) after the Latin American debt crisis of the 1980s. Debt overhang was defined as a scenario where a country's expected present value of potential future earnings was less than the value of its debt. Krugman, (1988) hypothesized that if a country's debt supersedes its repayment ability, the expected debt service costs would discourage both domestic and foreign investment. This is because the productive investment's expected rate of return would be very low to support the economy as the significant portion of any subsequent economic progress would accrue to the creditor country. As a result, both domestic and foreign investment would further decline, thereby reducing economic growth (Krugman, 1988; Sachs, 1989).

The major concerns with this framework in a low-income country (LIC) context are twofold. Firstly, the model assumes that borrowing and investment decisions are made simultaneously which is seldom the case in low-income countries. This is because some of the external borrowing done by LICs is for the purpose of financing deficits (Adam & Bevan, 2005). Secondly, the model was made based on middle income countries, whose debt was highly non-concessional. To address this, Koeda (2008) developed a theoretical debt overhang model for low income countries as a concessional lending problem. This is discussed in the next section.

3.2.2 Debt Overhang Model for Low Income Countries

In this model Koeda (2008) assumes that two types of agents exist: a low-income country which is a debtor and an official creditor (for example the IMF or World Bank). The creditor lends at a subsidized and fixed interest rate if the borrowing country lies at or below a given cut off point. A cut off point comprises a given level of GNI per capita, above which a country is not considered eligible for concessional loans. Above the cut off, the creditor also lends at the world interest rate. The creditor is assumed to commit to the contract, but the debtor is assumed to not always commit to the contract. The official creditors typically fix their concessional interest rates, for instance IDA charges 0.75% and IMF under the PRGF 0.5%. It should be pointed out at this stage that these are not interest rates per se but rather come as a service charge.

The model assumes that the creditor, having full access to world financial markets lends out funds at a fixed and subsidized interest rate $(\bar{r})$ if the country's output per capita (y) is below the cutoff point $(\bar{y})$. The creditor therefore sets interest rates according to the following rule:

$$\tilde{r}_{t+1} = \begin{cases} \bar{r} & if \quad y_t \leq \bar{y} \\ r & otherwise \end{cases} \tag{3.1}$$

Where r is the world interest rate and $\bar{r} < r$.

The debtor country is assumed to have no access to private foreign finances, as it is the case in most low-income countries who do not have access to international capital markets.

The model further imposes a participation constraint to encourage the debtor country to stick to the contract. Given this constraint, the debtor country's value function under repayment is required to be greater than or equal to its value function under

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default. That is to say, the borrowing country has more value and is better off with the loan and subsequently servicing the loan as compared to when it defaults on the loan. The debtor country therefore solves the following problem:

$$\max_{\{c_t, k_{t+1}, X_{t+1}\}} \sum_{t=1}^{\infty} \beta^{t-1} u(c_t), \tag{3.2}$$

Subject to

$$v^D(k_t) \le u(c_t) + \beta^{j-1} u(c_{t+j}) \tag{3.3}$$

$$c_t = f(k_t) - x_t + X_{t+1}/(1 + \tilde{r}_{t+1}) - X_t \tag{3.4}$$

$$k_{t+1} = (1-\delta)k_t + x_t \tag{3.5}$$

k_1 and X_1 are given

$\tilde{r}_{t+1}$ follows rule given by equation 3.1

In this framework,

c is consumption

x is investment

k is capital

X is repayment obligation

Equation 3.4 gives the low-income country's flow budget

Equation 3.5 gives the transition equation for capital where δ is the rate of capital depreciation.

$v^D(k_t)$ represents the value function under default.

In making reference with the debt overhang model as designed by Cohen and Sachs (2008), Koeda substituted the participation constraint with a debt capacity function which is implicitly defined by $v^R(k,h) = v^D(k)$

The original value function under repayment can therefore be written as shown in equation 3.6 below

$$v^R(k,X) = \max_{k'X'}\{u(f(k)-k'+(1-\delta)k$$
$$+\{\frac{X'}{(1+\tilde{r}(k))},\frac{h(k')}{(1+\tilde{r}(k))}\} -X) +\beta v^R(k',X')\} \qquad (3.6)$$

This formulation is identical to that used by Cohen and Sachs (1986). Koeda (2008) however used the value function iterative method to numerically derive the value functions and extended the model to analyze the dynamics of concessional loans in low income countries.

Using the numerical analysis, Koeda showed that there is a threshold, above which a country is trapped with large debt and no economic growth. Figure 4 depicts a graphical representation of this. The debt overhang threshold is represented by the solid line running form the left-hand side vertical axis. Countries that lie in the areas A and B will converge to low steady state whilst countries that lie in the C and D areas are able to achieve high steady state. Countries that lie in the areas E and F in this case are those who are not qualified for concessional borrowing as their national incomes surpass the given benchmark criteria for concessional loans.
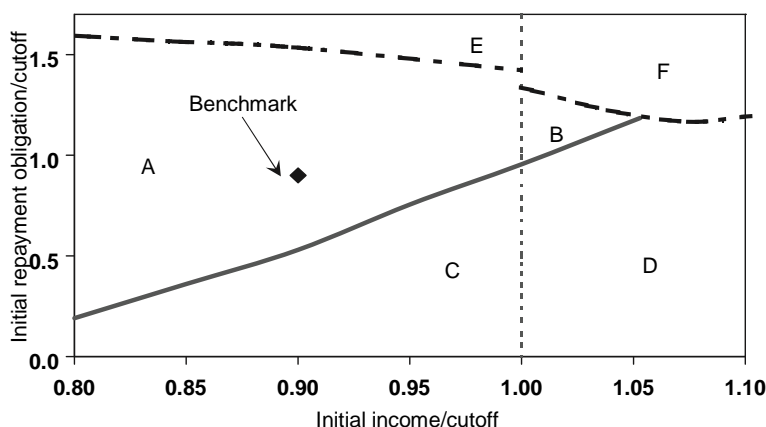
Figure 5: Debt Overhang threshold and initial conditions

3.2.3 Additions to the Debt Overhang Theory

Classens and Diwan (1990) have narrowed down the definition of debt overhang to a situation where the illiquidity and disincentive effect, or both are strong enough to discourage growth in the absence of concessions by creditors. They argue that high debt level leads to increased tax rates because the borrowing economy will be trying to generate more revenue. This in turn reduces the amount of funds available for domestic investment and thus growth.

Sachs (1989a) also tries to explain the debt overhang hypothesis by the Debt Laffer Curve hypothesis. This was derived from the Tax Laffer curve hypothesis originally introduced by Arthur Laffer who argued that an increase in personal taxes would in the long run reduce government revenue because it would discourage investment and promote tax evasion. Freytag et al (2008) have also complemented this theoretical standpoint by arguing that the NPV of debt service increases with an increase in debt stock up to a certain point beyond which a higher face value of the debt is associated with lower investment efforts and lower economic growth. Figure 3 shows the Debt Laffer curve. As depicted in this figure, increased debt stock is initially associated with an increase in per capita growth until a threshold point where debt starts to

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reduce growth when debt service takes up a significant amount of resources that would initially be used for growth.
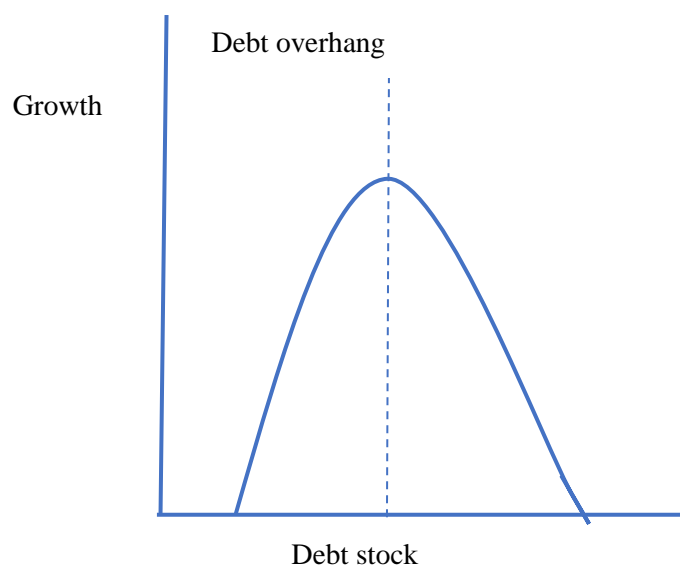
Figure 6: The Debt "Laffer Curve"

3.3 Empirical Literature

A lot of research on foreign debt has mostly focused on foreign debt's implications on economic development and little focus has been paid to assessing the effect of foreign debt service on the economy. There have been mixed results from these studies. While other studies have shown that foreign debt is important for economic development, others have found that foreign debt is detrimental for growth and others have found no relationship at all.

3.3.1 Foreign Debt and Economic Growth

Ayadi and Ayadi (2008), in a comparative study of South Africa and Nigeria investigated the relationship between debt and economic growth. Their findings indicated a significantly strong positive relationship between debt and output growth,

ascertaining the importance of debt in these countries. Abdelhadi (2013) also explored the relationship between external debt and economic growth in Jordan and found that there was a positive and significant relationship between external debt and economic growth in the country over the 1990-2011 study period. Durbary et. al. (1998) assessed the impact of foreign aid on growth for several developing countries in Latin America, Caribbean and sub-Saharan Africa[7]. Using an augmented Fischer-Easterly type model they found that economic growth was positively influenced by foreign aid, given a stable macroeconomic environment.

On the other hand, other countries' findings have found contrasting results. Iyoha (1996) used a simulation approach to examine the impact of external debt on economic growth in sub-Saharan African countries. His findings showed a negative relationship between debt overhang, crowding out and investment. Foreign debt was found to be depressing investment through both a disincentive effect and a crowding out effect, thus negatively affecting economic growth. Fosu (1996) on the other hand found that the burden of debt, whether measured as debt outstanding or debt service was detrimental to growth in SSA. He however found that the effect of these variables was weak and indirect as debt negatively influenced the nature and consequently productivity of investment undertaken. Mbire, (1999) analyzed the effect of debt on economic growth in Uganda. The findings indicated that debt payments had been a fundamental cause of low economic growth in the country. Were (2001) found that debt accumulation had a negative impact on economic growth and private investment for Kenya over the period 1970-1995. Munzara, (2015) in assessing the impact of foreign debt on economic growth in Zimbabwe, found that external debt and trade

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[7] A total of 58 countries including Madagascar, Malawi, Ghana, Rwanda, Mexico and Philippines were used in the study.

openness impacted negatively on economic growth while capital investment and labour force growth had a positive effect.

In a non-African context, Checcherita-Westpal and Philipp (2010) investigated the impact of growing debt on economic growth for the 12 euro area countries over 40 years from 1970. Their findings showed that a nonlinear impact of debt on growth existed up to a certain threshold. Beyond this threshold, incremental debt had negative implications on long-term growth.

The most recent study conducted in the context of Malawi is one by Tchereni et al. (2013). This study examined the impact of external debt in economic growth in Malawi with data covering the period 1975-2003 using OLS technique. The findings showed a statistically insignificant and negative relationship between foreign debt and economic growth. The study suggested that the country was better off providing incentives to local manufacturers who would want to export rather than relying on borrowing for growth inducement.

3.3.2 Foreign Debt Service and Economic Growth

Hameed, et al. (2008) assessed the dynamic consequence of foreign debt service, capital stock and labour force on economic growth for Pakistan for the period 1970–2003. Their findings revealed that foreign debt service had an adverse effect on capital and labour productivity which hindered economic growth. Fosu (2010) analyzed the effect of debt service on government expenditure in sub-Saharan Africa. He concluded that intense debt servicing would shift public expenditure away from the social sectors of health and education, and possibly from public investment also.

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He further observed that external aid exhibited positive effects on the expenditure shares of the social and public investment sectors, though the impacts were small, especially in comparison with the debt effects. Adesola (2009) on the other explored the effect of external debt service payment practices on sustainable economic growth and development in Nigeria using OLS technique. His findings revealed that debt service did not negatively influence GDP and Gross fixed capital formation.

3.3.3 Determinants of Public Investment

Most of the economic literature on investment focuses on the roles and determinants of private investment as contributory to economic development. As a result, there has not been a theoretical model on the determinants of public investment. Most of the literature available is empirical and has varied from one country to another.

Analysis of the factors affecting public investment in Malawi has also received little research attention. However, a few studies on the same have been conducted all over the world. These have revealed that the factors identified have different implications on public investment across different countries.

Heller (1975) analyzed public fiscal behavior in 11 African countries (Liberia, Tanzania, Malawi, Nigeria, Zambia, Ghana, Kenya, Uganda, Morocco, Ethiopia and Tunisia) over the period of 1961 and 1971. His findings showed that foreign aid not only increased public investment, but also facilitated a decrease in the levels of domestic taxes and borrowing. However, the different types of aid had different implications whereby loans induced more investment whilst grants induced more consumption spending.

A study by de Haan et al. (1996) also examined the factors that influenced public capital spending using a panel of 22 OECD countries over a period of 1980-1992. Their findings indicated that fiscal stringency reduced capital spending and frequent government changes also influenced capital spending. They however did not find evidence of political business cycles[8] affecting public investment in these countries. Chand and Kumar (2004) explored the determinants of capital formation and agricultural growth in India using a simultaneous equation model over a period of 1970-2002. The results showed that an increase in subsidies (or a reduction in revenue receipt from agriculture) reduced public sector capital formation.

An analysis of the determinants of public investment in European countries by Mehrota and Valila (2006) found that national income had a positive impact on public investment in both cohesion and non-cohesion EU countries. Discretionary changes in fiscal policy were found to move together with public investment, whilst public debt was found to reduce public investment in cohesion EU countries only. The study used annual data covering a period of 1970-2003. In 2011, Hanousek and Kocenda also analyzed the dynamics of public investment and public finance in countries who became members of the EU in May 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic and Slovenia). Their findings indicated that public investment is often linked with increases as well as decreases in corruption depending on the country's institutions. That is, institutions that improved the corruption environment were found to be associated with improvements in fiscal positions of most of the new EU countries which in turn improved public investment.

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[8] Political business cycles refer to fluctuations of economic activity resulting from interventions of politicians to stimulate the economy prior to an election year.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter discusses the model that is used in this study and how the model is specified and estimated. It further gives the measurement of the variables, describing the data that is used in the study and the sources of such data. Time series properties of the variables and how they are dealt with in the study are also explained. Finally, the chapter describes the Diagnostic Tests that are carried out in the study.

4.2 Analytical framework

To address the first objective, the study analyzed the relationship between debt service and public investment in Malawi, the study develops an empirical model presented in equation 4.2. This model has been calibrated to fit the relevant variables for Malawi according to the review of literature. The standard functional specification of the long run relationship for the public investment equation is expressed as shown in Equation 4.2.

$$PI_t = f(POPGR_t, POLBCY_t, TO_t, FD_t, FDS_t)$$

$$(4.1)$$

Where,

PI_t is public investment

$POPGR_t$ is population growth

$POLBCY_t$ is the political business cycle

TO_t is trade openness

FD_t is Foreign debt

FDS_t is total foreign debt service

4.3 Model specification and estimation

To estimate the long run relationship between debt service and public investment in Malawi, the study used a cointegration approach. The concept of cointegration was introduced by Engle and Granger (1987) and it refers to a situation where the linear combination of an integrated (non-stationary) series is stationary. Once variables are found to be cointegrated, it implies that there exists a long run relationship among them. Several cointegration techniques (such as the Johansen test for cointegration and the Engle-Granger test for cointegration) exist, however, for the purposes of this study the Autoregressive Distributed Lag (ARDL) Bounds testing procedure which was developed by Pesaran et al. (2001) is used.

This model is chosen for this study due to its advantages over other cointegration techniques. Firstly, it does not require all the variables in the model to be integrated of the same order as it can allow for both I(0) and I(1) variables. Secondly, the Bounds testing procedure is a much more statistically significant approach for small samples and this allows for different optimal lag lengths of the variables. Lastly, it has the capability to estimate both short-run and long-run parameters of the model simultaneously (Abdulabaset et al., 2013). To implement the bounds testing procedure, Equation 4.2 is modelled as an autoregressive distributed lag model as shown in Equation 4.3.

$$\Delta PI_t = \alpha_0 + \sum_{i=1}^{n} \theta_{1i} \Delta PI_{t-i} + \sum_{i=0}^{n} \theta_{2i} \Delta POPGR_{t-i} + \sum_{i=0}^{n} \theta_{3i} \Delta TO_{t-i} + \sum_{i=0}^{n} \theta_{4i} \Delta FD_{t-i} + \sum_{i=0}^{n} \theta_{5i} \Delta FDS_{t-i}$$

$$+ \delta_1 POLCY + \beta_1 PI_{t-1} + \beta_2 POPGR_{t-1} + \beta_3 TO_{t-1} + \beta_4 FD_{t-1} + \beta_5 FDS_{t-1} + \varepsilon_t$$

(4.2)

Where α_0 is the intercept term; $\theta_1 - \theta_5$ and $\beta_1 - \beta_5$ are short-run and long-run coefficients respectively of public investment with respect to above identified variables; δ_1 is the coefficient for the dummy variable political business cycle; ε_t is the error term; Δ is the difference operator; and n is the lag length. Here, all the variables are as previously defined in Equation 4.1. The error correction model of the ARDL model given in equation 4.2 is expressed as shown in equation 4.3 below.

$$\Delta lnPI_t = \alpha_0 + \sum_{i=1}^{n} \theta_{1i} \Delta lnPI_{t-i} + \sum_{i=0}^{n} \theta_{2i} \Delta POPGR_{t-i} + \sum_{i=0}^{n} \theta_{3i} \Delta lnTO_{t-i} + \sum_{i=0}^{n} \theta_{4i} \Delta lnFDS_{t-i}$$

$$+ \sum_{i=0}^{n} \theta_{5i} \Delta lnFD_{t-i} + \pi_1 ECM_{t-1} + \varepsilon_t$$

(4.3)

Where π_1 is the coefficient of the error correction term; ECM_{t-1} is the error correction term lagged by one period; and all other variables are as previously defined in Equation 4.1.

In estimating the ARDL model, it is imperative for the appropriate lag length to be determined for each of the variables in the model. This is important because it makes sure that standard error terms which do not suffer from autocorrelation, non-normality and heteroskedasticity are obtained (Nkoro & Uko, 2016). In this case, the Akaike Information Criterion (AIC), Schwarz criterion and Adjusted R-squared were used to

select the model with the optimal lag length. All variables used in the model were log-transformed except for population growth rate. All variables in the model were sourced from the World Bank's World Development Indicators.

4.4 Variable Definition and Expected Signs

Public investment

The study uses gross fixed capital formation by the government to measure public investment. This variable is computed by subtracting private sector GFCF from total GFCF to get a value of the government's level of GFCF. The variable government GFCF has been widely used by several studies (Mehrota & Valila, 2006; Hanousek & Kocenda, 2011; Chand & Kumar, 2004) as a good measure of public investment in an economy. According to the World Bank database, GFCF includes land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Public investment is captured as gross fixed capital formation by the government as a percentage of GDP. Coefficients on the lagged variables of public gross fixed capital formation are expected to have a positive sign.

Population growth rate

The study hypothesizes that population growth influences public investment. An increase in a country's population results into an increase in the demand for public infrastructure such as schools and hospitals. The government is therefore more likely to direct more funds to public infrastructure to cater for a growing population. This variable is measured as the annual population growth rate. The use of population

growth as a determinant of government capital formation is supported by Hansen (1965) who found a positive relationship for the case of Belgium. It is therefore expected that the coefficient on population growth will have a positive sign.

Political business cycle

The study also includes a dummy variable on election years as determinants of public investment. Most countries tend to increase aggregate consumption and reduce investment in election years (Ebeke & Olcer, 2013). The model therefore includes this variable to analyze the political business cycle for the case of Malawi. It is expected that the political business cycle variable will have a negative sign.

Trade openness

Trade openness is computed as the total trade (sum of total imports and exports) as a percentage of GDP. The trade openness is suggested to be an important positive determinant of investment in developing countries as it represents accessibility to modern technologies for domestic country (Abdulabaset et al, 2013). Hence, it is expected that trade openness will have a positive sign.

Foreign Debt

Most of the foreign debt taken in developing countries is mainly aimed at implementing development projects. This variable is measured as foreign debt flows in current USD**.** The study hypothesizes that increased levels of debt flow are associated with increased levels of public investment. Empirical literature has mainly focused on the effect of foreign debt on economic growth. Results have been mixed as

others have found a positive relationship, whilst others have established a negative relationship

Foreign Debt Service

This constitutes the sum of principal repayments and interest payments paid in currency, goods, or services on long-term debt, interest paid on short term debt and repayments (repurchases and charges) to the creditors. Foreign debt service is measured as foreign debt service as a percentage of gross national income. It is expected that foreign debt service will have a negative sign.

4.5 Measuring Dynamic Responses

To address the second objective, impulse response functions (IRFs) were used. The IRFs trace the dynamic path of public investment in the system given a certain shock or effects of innovation due to a change debt service levels. The impulse responses are derived from the Vector Moving Average of a Vector autoregressive (VAR) model. Impulse response analysis links the current value of the error term to the future values of the variables in the VAR model. It is important to emphasize at this point that this study did not make any inference on the VAR model itself. The VAR model is highly criticized for its over parameterization which renders the t-statistics unreliable in most cases. In addition to this, the coefficients of the VAR model cannot be interpreted. This study however only focused on the impulse response functions derived from it.

4.6 Stationarity tests

Before undertaking the empirical analysis, it is imperative that all the variables used be subjected to stationarity tests. This is important to ascertain that the variables are

not integrated of a higher order than one as per requirement of the ARDL Bounds testing procedure. To test for stationarity, this study used CMR-IO unit root tests which are considered superior to the conventional Dickey Fuller Tests (Baum, 2001). The major weakness of the Dickey Fuller stationarity tests is that they have potential to confuse structural breaks in the series as evidence of non-stationarity. The CMR-IO unit root test has been preferred in this case as it is able to test for a unit root in the presence of structural breaks. Several unit root tests in the presence of structural breaks such as the Zivot-Andrews and Perron Vogelsang tests are also in existence, but the CMR-IO has been preferred due to its ability to detect two structural breaks which cannot be handled by the former two tests. The CMR framework consists of two models namely the Additive Outlier (AO) and the Innovation Outlier (IO). For the purposes of this study, the IO has been adopted because it allows for a gradual shift in the mean of the series and can identify long run impacts of the changes employed in the model (Muchai & Muchai, 2016).

4.7 Diagnostic tests

To ensure that the models estimated in the study yield reliable estimates and not spurious results, the study conducted several diagnostic tests. These included testing for stationarity, parameter stability, regression specification error, normality, serial correlation and heteroskedasticity.

Firstly, the study used the CMR-IO unit root test to determine the stationarity and order of integration of the variables used in the model. This was to make sure that the nature of variables agreed with the estimation model used.

To test for parameter stability, the Cumulative Sum of Recursive Residuals and Cumulative Sum of Squares of Recursive Residual Plots were used. The tests plot the cumulative sum and cumulative sum of squares of recursive residuals together with the 5% critical lines. These tests find parameter instability if the cumulative sum or cumulative sum of squares move outside the area between the two critical lines.

The Ramsey's RESET (Regression Specification Error Test) was also used to test for the presence of specification error in this study. This is a general test for specification errors such as presence of omitted variables, incorrect functional form and correlation between regressors and the error term due to measurement errors in the regressors, simultaneity bias and presence of lagged regress and values and serially correlated disturbances. These specification errors render the conventional inference procedures invalid as least squares estimators are biased and inconsistent.

The study also tested for normality using the Jarque-Bera test statistic. This test plots a histogram and computes the test statistic to determine whether the residuals are normally distributed. If the residuals are normally distributed, the histogram is bell shaped and the Jarque-Bera test statistic is insignificant.

The Breusch-Godfrey Serial Correlation LM test was also used to test for serial correlation. In this study, this test is preferred to other serial correlation tests because it is applicable whether there are lagged dependent variables or not and it can also identify serial correlation of higher orders.

To test for heteroskedasticity, the White test was used. The major advantages of the White test as opposed to other tests for heteroskedasticity are that it does not assume that there is a monotonic relationship between the variance of the error term and any regressor as it allows for the presence of interaction terms. In addition to this, it tests for heteroskedasticity in the entire model, as opposed to other tests which involve testing each regressor separately.

4.8 Data and Data Sources

The study used annual data sourced from the World Bank's World Development Indicators covering a period of 41 years from 1975 to 2015. The study used Stata and E-Views for data analysis. Stata was used to conduct the Clemente-Montanes-Reyes Unit root tests and E-Views was used to estimate the ARDL model and conduct the diagnostic tests.

CHAPTER FIVE

RESULTS AND DISCUSSIONS

5.1 Introduction

This chapter presents the empirical results of the study obtained from estimation of the models discussed in the previous chapter. Furthermore, the chapter provides the economic and statistical implications of the findings.

5.2 Stationarity test results

Table 3 shows the results of the Clemente Montanes Reyes – Innovation Outliers Unit root test. This test was preferred to the conventional dickey fuller tests as it can correctly test for a unit root even in the presence of structural breaks. The test was therefore used, given the nature of some of the macroeconomic variables used in the study which are prone to structural changes due to regime shifts and government intervention. In the CMR framework, the Innovation Outliers (IO) framework was used due to its ability to endogenously find the break years and allow for the depiction of two structural breaks. The variable foreign debt service had break points in 2000 and 2005. This conforms to what has been happening in the country as debt service drastically changed in 2006 due to debt relief which changed the debt service pattern. As depicted in Table 3, foreign debt flows, and foreign debt service are stationary at first difference whilst population growth, public investment and trade openness are stationary at levels.

Given these results, estimation of the ARDL model is permissible as the model allows for a mixture of I(0) and I(1) variables. Detailed graphical representations of the CMR-IO unit root tests indicating the break points are found in Appendix 1.

Table 3: CMR-IO Unit root test results

Variable	Break year	I(0)	I(1)
Foreign debt	1998, 2009	-4.824	-12.530*
Foreign debt service	2000, 2005	-2.606	-7.059*
Population growth	1982, 1987	-5.593*	
Public investment	1979, 2000	-6.252*	
Trade openness	1992, 2000	-6.496*	

*The critical value at 5% significance level is -5.490. All variables are in logs except for population growth

5.3 Diagnostic Tests

To ascertain the relevance of the interpretations presented by the estimated model, diagnostic tests were conducted. Table 4 shows the results of the diagnostic tests.

Table 4: Diagnostic test results

Test	Test statistic*	P-value
Normality test	0.381348	0.826402
Breusch-Godfrey Serial Correlation test	3.156282	0.0644
White test	1.420058	0.2274
Ramsey RESET test	1.235427	0.2789

*All tests use F-statistic for hypothesis testing except for the Normality test which uses the Jarque-Bera test statistic.

To ascertain that the residuals in the model are normally distributed, the normality test was conducted. The test uses the Jarque-Bera statistic which has a chi-square distribution and operates under the null hypothesis of normally distributed residuals. As shown in table below, we fail to reject this null hypothesis as evidenced by

insignificant Jarque-Bera statistic and p-value thereby concluding that the residuals are normally distributed.

The Breusch-Godfrey serial correlation test was also used to test for serial correlation. This test operates under the null hypothesis of no serial correlation. From the results obtained, there is no presence of serial correlation in this model as the F-statistic and p-value are statistically insignificant at 5% critical level.

According to the White test, there is no heteroskedasticity in the data as we fail to reject the null hypothesis of homoskedasticity due to the insignificant F-statistic and p-value. The white test did not use cross products in testing for heteroskedasticity due inadequate degrees of freedom.

Results from the Ramsey RESET test show that there is no specification error in the model as we fail to reject the null hypothesis of white noise residuals (no specification error) due to insignificant test statistics.

The cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) of recursive residuals were also used to test for parameter stability. As depicted in figure 6, the parameters appear to be stable over time at 5% significance level as the cumulative sums did not go beyond the area between the critical lines in both cases.
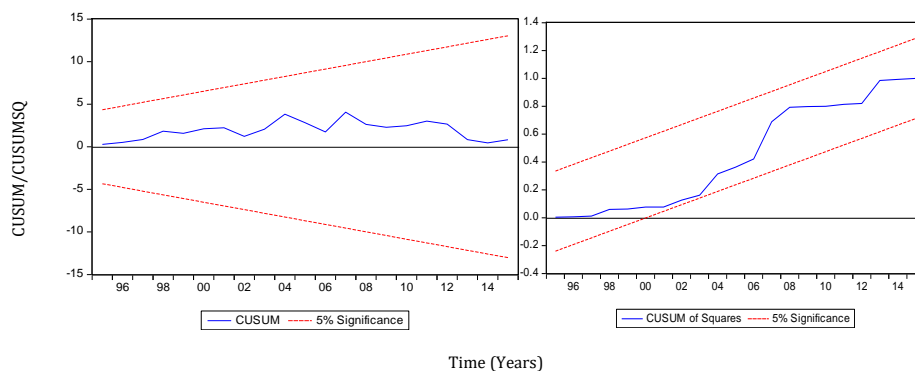
Figure 7: CUSUM and CUSUMSQ

In general, all diagnostic tests show that the model does not violate any time series properties that may lead to spurious regressions and unreliable statistical inferences.

5.4 ARDL Bounds Test

Table 5 presents results of the ARDL bounds test for cointegration. As shown the calculated test statistic (6.776149) is greater than the 5% critical values. The null hypothesis of no existence of a long run relationship is therefore rejected further implying that a long run relationship of the statistically significant variables presented in the previous section exists. That is to say, public investment has a long run relationship with foreign debt service, trade openness and population growth.

Table 5: ARDL Bounds test results

		5% Critical value bounds	
		I(0) bound	I(1) bound
Test statistic	6.776149	3.47	4.57

5.5 Empirical estimation of the ARDL model

Table 6 presents the empirical results from the long run model obtained by normalizing the coefficients on the dependent variable gross fixed capital formation. The variable *POLBCYCLE* (political business cycle) was introduced in the model as a fixed regressor as it is a dummy variable. The model estimation was initially based on 41 observations but after the model adjustments, 37 observations were included in the model.

There exists a negative relationship between public gross fixed capital formation and foreign debt service as evidenced from the p-value (0.0001) which is significant at 1%. That is, a 1% increase in the level of foreign debt service results into a 0.17%

decline in the level of gross fixed capital formation. The presence of this inverse relationship provides evidence of the crowding out effect that foreign debt service has on public investment in Malawi. That is, even though a large proportion (about 76%) of the country's debt is concessional, debt service on the same still negatively influences the country's prospects to increase its productive capacity through gross fixed capital formation. This finding complements the findings of Tchereni et al (2013), who found that foreign debt did not significantly influence economic growth in Malawi, implying that the inflow of foreign debt did not necessarily translate into the advancement and improvement of capital formation in the country. The inverse relationship found here can explain why this may be so as it can be argued in this case that a significant amount that may have been allocated to capital formation was rather utilized for servicing the foreign debt. The negative coefficient on foreign debt flows suggests that a negative relationship also exists between debt flows and public investment; however, this relationship is not statistically significant at 5% significance level.

Table 6: Estimation results of the long-run ARDL Model

Variable	Coefficient	Std. Error	p-value
ln *FDS*	-0.173596***	0.037955	0.0001
ln *FD_FLOWS*	-0.150783*	0.079644	0.0716
ln *TO*	0.673643***	0.160177	0.0004
POP_GROWTH	-0.114836***	0.024095	0.0001
POLBCYCLE	0.041803	0.047460	0.3879
Constant	3.600717***	1.229079	0.0078
Trend	-0.042028***	0.003675	0.0000

Dependent variable: ln *PUBLIC_GFCF*; Selected model: ARDL (4, 0, 1, 0, 3);

Sample: 1975-2015; Included observations: 37

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

There exists a positive relationship between public gross fixed capital formation and trade openness as evidenced from the highly significant t-statistic and p-value. This corresponds to the empirical literature by Abdullabaset (2013) who found that trade openness stimulates growth in capital formation as an increase in trade openness increases a country's access to modern technologies which it can use for capital formation. In addition, since most of the public capital formation done in Malawi requires inputs from foreign countries, an increase in imports (which in turn increases the level of trade openness) is likely to also increase capital formation as is the situation in this case.

Population growth is found to be negatively related with public investment. This finding is rather counterintuitive as an increase in population is supposed it be accompanied by an increase in public investment as the government is likely to devote more resources to public investment as the population increases (Juarez & Almada, 2016; Hansen, 1965). However, the finding of a negative relationship in the case of Malawi can be explained in such a way that increased population growth for a low-income country like Malawi may imply that expenditures would be directed towards social services to cater for the growing population other than devoting resources to more long-term initiatives like capital formation. Nevertheless, the short run dynamics of population growth and public gross fixed capital formation discussed later in this section provide a more lucrative explanation.

There is no statistically significant relationship between the political business cycle and public investment in Malawi as all the test statistics are insignificant for its

coefficient. Thus, according to this study, public investment spending is not affected in election years.

Table 7 shows the short run dynamics of this model. In the short run, there exists a negative relationship between foreign debt service and public investment. That is, as foreign debt service increases in each year, the level of capital formation reduces in that year.

There exists a positive relationship between the level of capital formation in the previous three consecutive years and the current level of capital formation by the government (as depicted from the significant p-values at 1% for the three lagged values of public gross fixed capital formation). That is to say, an increase in government capital formation in each year will be influenced by the increase in capital formation in the last three consecutive years.

A negative relationship also exists between debt flows and public investment; however, this relationship is not statistically significant. Trade openness was found to significantly influence the level of public investment positively at 1% level in the short run.

The third lag of population growth is found to be positively related with public investment. This finding suggests that it takes a period of rather three years in this case for public gross fixed capital formation to respond to an increase in population growth.

The political business cycle also does not significantly influence the level of public investment over the study period in the short run. This concurs with the findings of de Haan et. al. (1996) who also found no effect of the political business cycle on a panel of 22 OECD countries.

Table 7: Estimation results of the short-run ARDL model

Variable	Coefficient	Std. Error	p-value
Δln $PUBLIC\_GFCF_{t-1}$	0.952635***	0.243134	0.0007
Δln $PUBLIC\_GFCF_{t-2}$	0.695683***	0.187108	0.0012
Δln $PUBLIC\_GFCF_{t-3}$	0.534352***	0.134086	0.0006
Δln FDS	-0.322582***	0.093623	0.0023
Δln FD_FLOWS	-0.131611	0.117478	0.2747
Δln TO	1.251789***	0.230523	0.0000
ΔPOP_GROWTH_{t-1}	-1.472165*	0.725383	0.0547
ΔPOP_GROWTH_{t-2}	0.750355**	0.289224	0.0166
$\Delta POLBCYCLE$	0.077680	0.088167	0.3878
Trend	-0.078098***	0.014636	0.0000
ECM_{t-1}	-1.858238***	0.284104	0.0000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Since the variables used in the model all have a long-term trend, regressing one against the other would be misleading and would lead to spurious regressions. The trend term was therefore included in the model as a form of de-trending (fitting and subtracting a linear trend). In this model, trend term is significant at 1% significance level (p-value=0.0000) showing that there is enough evidence of a trend in the data.

The error correction term has a negative coefficient and is statistically significant at 1% (p-value = 0.0000). In such a case where the value on the coefficient of this error correction term is between -1 and -2, it implies that the lagged error correction term produces declining fluctuations around the equilibrium path (Narayan & Smyth, 2006). Thus, the coefficient on the lagged error correction term (-1.858238) indicates that instead of monotonically converging to the equilibrium path directly, the error

correction process fluctuates around the long run value in a declining manner. However, once the process is complete, convergence to the equilibrium path is rapid.

5.6 Assessing the dynamic response of public investment to debt service

To assess the dynamic response of public investment to changes in the foreign debt service levels, impulse response functions were used. Figure 7 shows the dynamic path that public investment takes given a shock in foreign debt service in the study period. As shown in figure 7, a mild response in gross fixed capital formation is observed given a shock to foreign debt service. A confidence interval that contains zero implies that the null hypothesis that the true response is equal to zero cannot be rejected (Ji & Kim, 2005). This implies that despite the mild response depicted in figure 7, the response in public investment (capital formation) to a shock in foreign debt service is not statistically significant at 95% confidence level.

Response of LNPUBLIC_GFCF to Cholesky
One S.D. LNFDSGNI Innovation
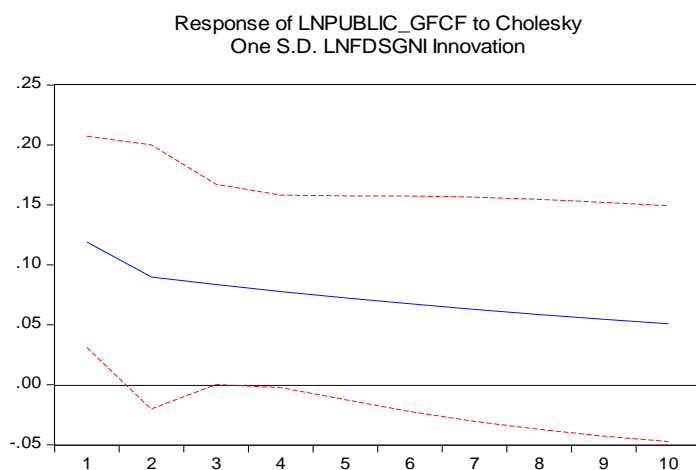
Figure 8: Impulse response function

From the findings presented in figure 8, we fail to reject the null hypothesis that there is no dynamic response in public investment due to changes in debt service levels resulting from a shock.

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CHAPTER SIX

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter gives a summary of the results, the policy recommendations, limitations and areas of further research.

6.2 Summary of the Results

The underlying objective of this study was to empirically establish the relationship between foreign debt service and public investment in Malawi. Time series data covering a period of 41 years from 1975 to 2015 was used. The variable public investment was proxied by public gross fixed capital formation as a percentage of national income whilst foreign debt service was represented by the total foreign debt service as a percentage of national income. The study also incorporated other covariates (which include population growth, political business cycle, trade openness and foreign debt flows) in the model as guided by the related empirical and theoretical literature. Before providing the empirical findings, the study reviewed both theoretical and empirical literature surrounding issues of foreign debt, foreign debt service, public investment and economic growth.

Stationarity of the variables was established before estimating the model to avoid spurious results and guide on the type of model to be used for estimation. Results

from the CMR-IO unit root tests indicated that all variables were stationary at levels except for the variables foreign debt and foreign debt service which were stationary after first differencing. The ARDL model was therefore estimated from which both the short run and long run equations were estimated, and impulse response functions were drawn. Diagnostic tests were also conducted to ascertain the reliability of the model estimation and accuracy of the economic interpretations made. Results from these diagnostic tests indicated that there was no presence of serial correlation, heteroscedasticity and specification error. In addition, the residuals were normally distributed, and the parameters were stable over time.

From the ARDL model estimation results, foreign debt service was found to be negatively related to public investment both in the short run as well as the long run. In addition, foreign debt was found to not significantly influence public investment. This implies that increased debt acquisition did not necessarily translate into increased public investment in the country during the study period. This presents a scenario where the cost to foreign borrowing through debt service, outweighs the expected benefits of debt acquisition through reduced public investment in the country.

Having found this negative statistically significant relationship between foreign debt service and public investment, the study presents empirical evidence that foreign debt service inversely affects the level of public investment in Malawi. Hence, according to the findings presented, this study concludes that foreign debt service (despite being highly concessional) negatively affects public investment in Malawi.

This finding also provides evidence of the inadequacy of debt sustainability indicators set by the IMF. The IMF uses indicators such a debt to GDP ratio, debt-to-export ratio, debt-to-revenue ratio, debt service-to-exports ratio and debt service-to-revenue ratio to characterize a country's debt as sustainable or not. For instance, a country with a present value of debt-to-GDP ratio below 35% is characterized to have sustainable debt. Similarly, a country with a debt service-to-revenue ratio of less than 18% is deemed to have debt that is sustainable. Consequently, a country fulfilling these indicators is eligible for more debt and it is not categorized as one in distress. These measures, however, do not consider the implications of the actual levels of debt and debt service on other sectors of the economy in judging a country's debt sustainability. That is to say, using these indicators alone in judging a country's performance in terms of debt would be very misleading.

Results from the impulse response functions depicted a mild response of public gross fixed capital formation due to a shock in foreign debt service over time, however this response was not statistically significant.

6.3 Policy Recommendations

Having found that foreign debt service negatively influences public investment in Malawi has profound implications, as policies that influence foreign debt service will also in turn influence public investment. Efforts to ease up the foreign debt service burden will in turn allow for allocation of more resources to public investment in the country. Even though Malawi's foreign debt is highly concessional (repaid over a long period of time with very minimal interest rates), reducing the amount of foreign debt acquired would be beneficial in achieving adequate long run public investment in

the country. It is therefore advisable to policy makers that reducing the acquisition of foreign debt (hence debt service) would significantly improve the level of public investment in Malawi by rendering resources available for such initiatives. This is particularly important as the country now plans to embark on the MGDS 3 which highlights that public investment is key to the country's growth. The Strategy postulates that upscaling public investment with additional $1.2 billion in key priority areas such as industrialization, agriculture and energy will stimulate GDP growth by an average of 6.2% in its subsequent years of implementation through immediate multiplier effects. The strategy further identifies concessional borrowing as the major channel through which resource mobilization will take place during its implementation period. The government should therefore carefully consider the levels of both concessional and quasi-concessional borrowing it engages in so that debt service does not crowd out public investment initiatives in the country.

As discussed earlier, the use of IMF debt sustainability indicators alone in making decisions on debt is not adequate. It is therefore important that the government looks at the impact that the prevailing levels of debt are having on performance of other sectors of the economy before engaging in acquisition of more foreign debt.

6.4 Limitations and Areas of Further Research

Given the findings of this study that foreign debt service negatively influences public investment whilst foreign debt flows do not influence public investment in the country, it would be interesting for further studies to analyze the political economy surrounding foreign debt in Malawi. That is, an analysis of the efficiency of the

transmission mechanism from foreign debt acquisition to the final utilization of the debt would be interesting.

Due to data availability in the given time, the study only focused on the effect that foreign debt service has on public investment and did not look at the influence of domestic debt on the economy. It would therefore also be interesting if future studies explored the effect of domestic debt which has been on the increase in the recent decade. Furthermore, further studies would also look at an in-depth analysis of the effect that each of Malawi's creditors (both foreign and domestic) has on public investment in the country in the long run.

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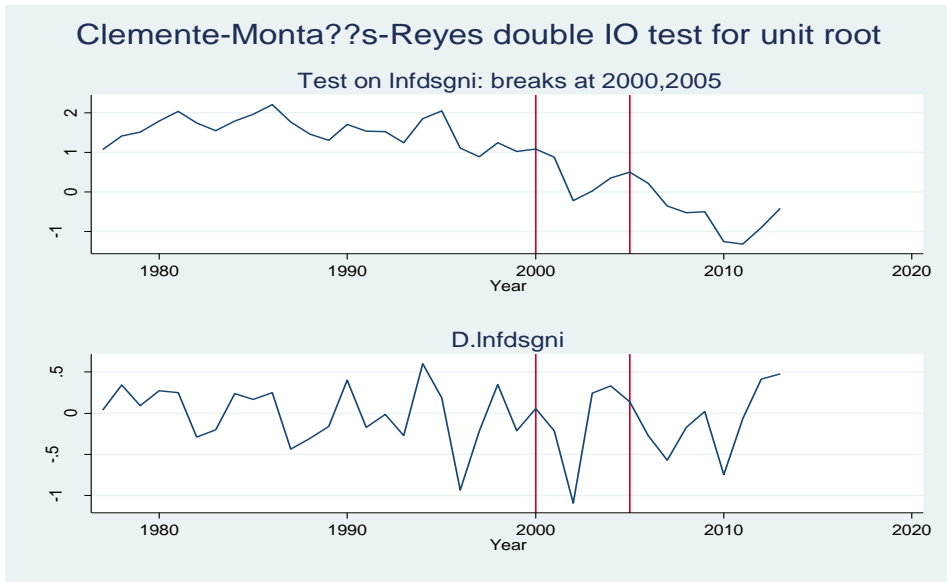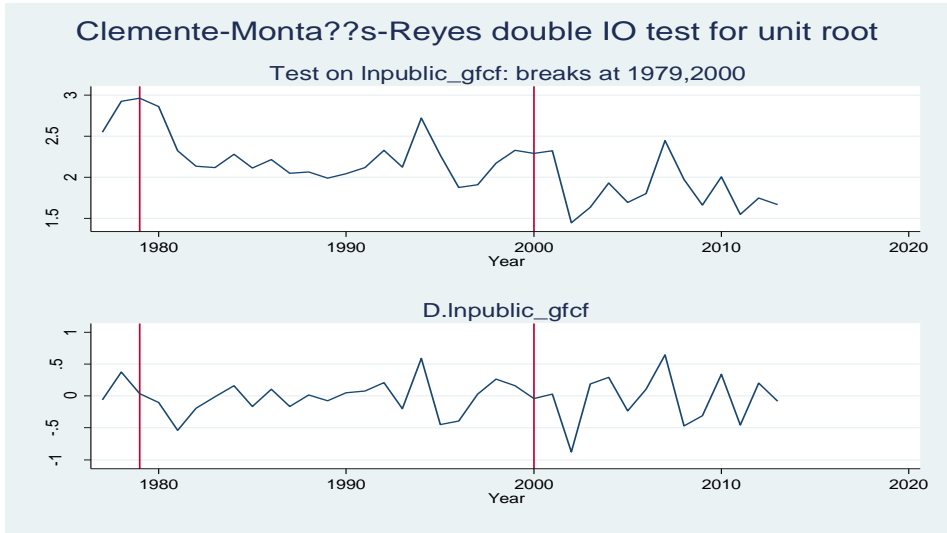
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APPENDICES

APPENDIX 1: CMR-IO UNIT ROOT TEST STRUCTURAL BREAKS GRAPHS

Clemente-Monta??s-Reyes double IO test for unit root
Test on Inpublic_gfcf: breaks at 1979,2000
D.Inpublic_gfcf
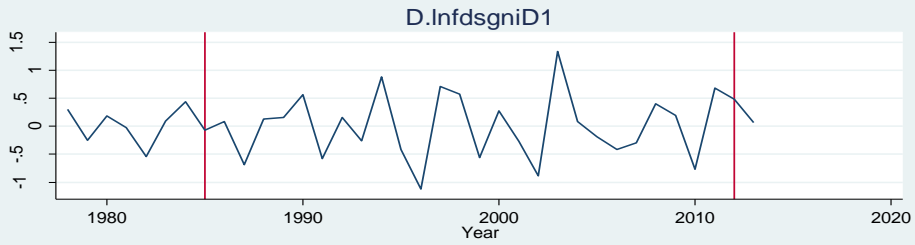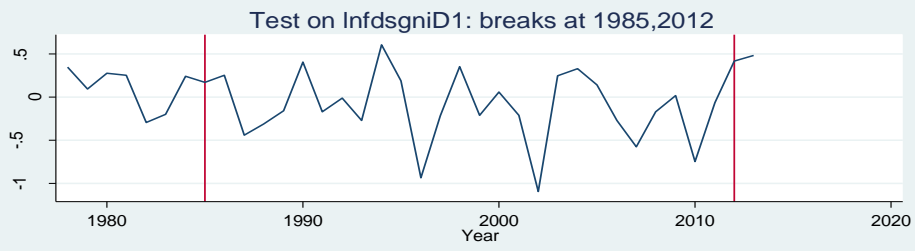
Clemente-Monta??s-Reyes double IO test for unit root
Test on Infdsgni: breaks at 2000,2005
D.Infdsgni

Clemente-Monta??s-Reyes double IO test for unit root

Test on InfdsgniD1: breaks at 1985,2012

D.InfdsgniD1

Clemente-Monta??s-Reyes double IO test for unit root

Test on Into: breaks at 1992,2000

D.Into

Clemente-Monta??s-Reyes double IO test for unit root

Test on lnfd_flows: breaks at 1998,2009

D.lnfd_flows

Clemente-Monta??s-Reyes double IO test for unit root

Test on lnfd_flowsD1: breaks at 1981,2009

D.lnfd_flowsD1

Clemente-Monta??s-Reyes double IO test for unit root

Test on pop_growth: breaks at 1982,1987

D.pop_growth
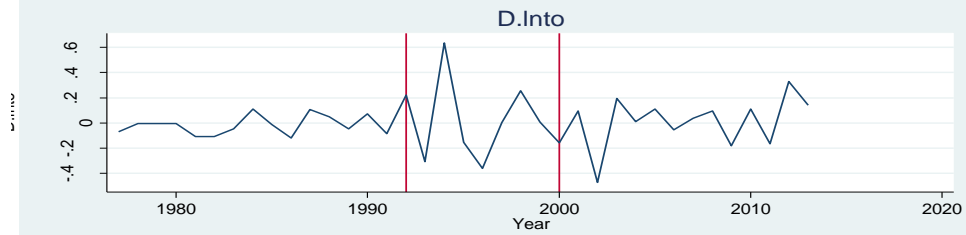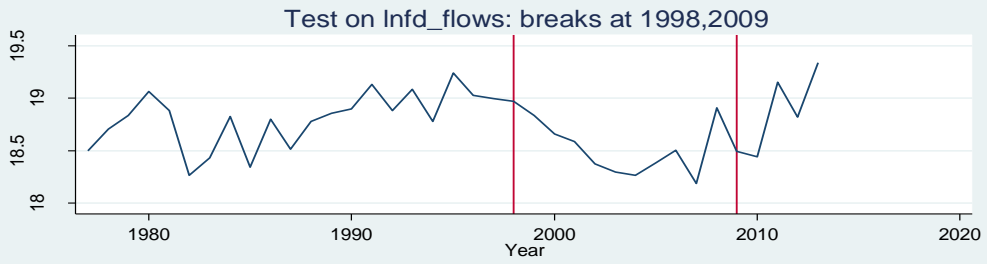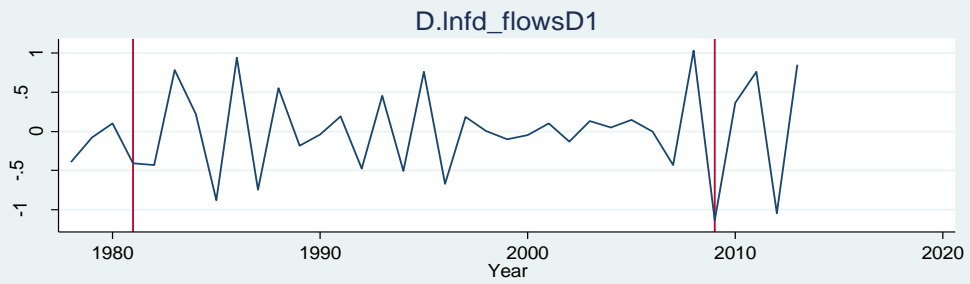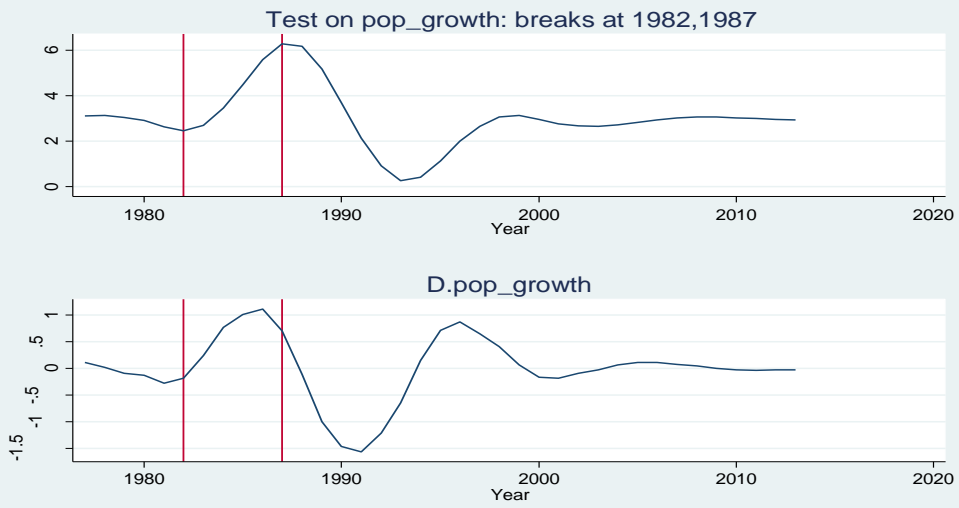
APPENDIX 2: ESTIMATION RESULTS OF THE ARDL MODEL (NORMALIZED ON THE DEPENDENT VARIABLE)

ARDL Cointegrating And Long Run Form
Dependent Variable: LNPUBLIC_GFCF
Selected Model: ARDL(4, 0, 1, 0, 3)
Date: 02/21/18   Time: 14:24
Sample: 1975 2015
Included observations: 37

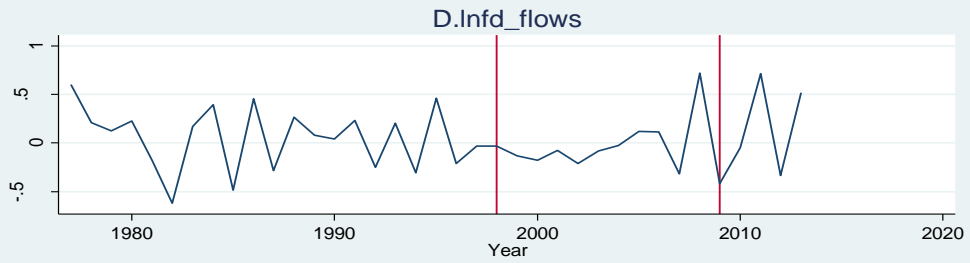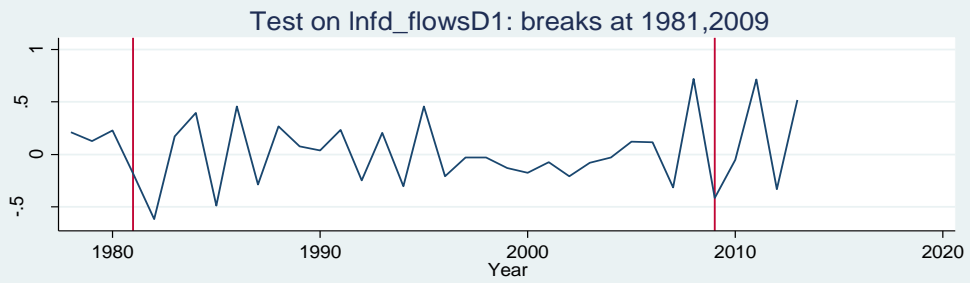| Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPUBLIC_GFCF(-1))	0.952635	0.243134	3.918148	0.0007
D(LNPUBLIC_GFCF(-2))	0.695683	0.187108	3.718090	0.0012
D(LNPUBLIC_GFCF(-3))	0.534352	0.134086	3.985132	0.0006
D(LNFDSGNI)	-0.322582	0.093623	-3.445557	0.0023
D(LNFD_FLOWS)	-0.131611	0.117478	-1.120302	0.2747
D(LNTO)	1.251789	0.230523	5.430212	0.0000
D(POP_GROWTH)	0.223843	0.286279	0.781906	0.4426
D(POP_GROWTH(-1))	-1.472165	0.725383	-2.029499	0.0547
D(POP_GROWTH(-2))	0.750355	0.289224	2.594375	0.0166
D(POLBCYCLE)	0.077680	0.088167	0.881050	0.3878
D(@TREND())	-0.078098	0.014636	-5.336144	0.0000
CointEq(-1)	-1.858238	0.284104	-6.540702	0.0000

Cointeq = LNPUBLIC_GFCF - (-0.1736*LNFDSGNI -0.1508*LNFD_FLOWS
  + 0.6736*LNTO -0.1148*POP_GROWTH + 0.0418*POLBCYCLE +
  3.6007 -0.0420*@TREND)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDSGNI	-0.173596	0.037955	-4.573725	0.0001
LNFD_FLOWS	-0.150783	0.079644	-1.893203	0.0716
LNTO	0.673643	0.160177	4.205614	0.0004
POP_GROWTH	-0.114836	0.024095	-4.765927	0.0001
POLBCYCLE	0.041803	0.047460	0.880796	0.3879
C	3.600717	1.229079	2.929605	0.0078
@TREND	-0.042028	0.003675	-11.436586	0.0000

ARDL Bounds test results

ARDL Bounds Test
Date: 02/21/18   Time: 14:25
Sample: 1979 2015
Included observations: 37
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	6.776149	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.03	4.06
5%	3.47	4.57
2.5%	3.89	5.07
1%	4.4	5.72

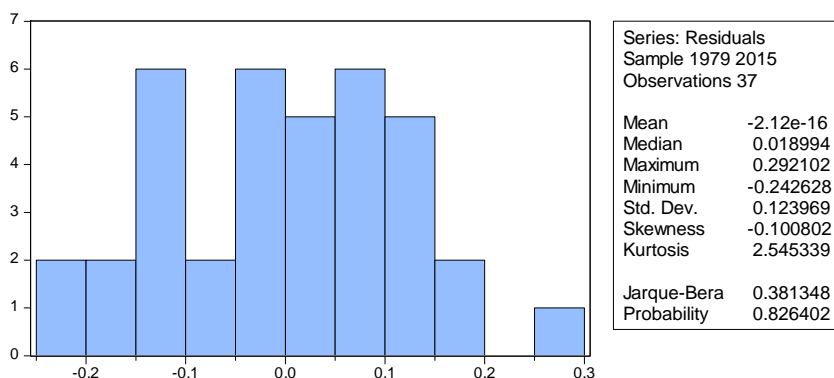|			
R-squared	0.695935	Mean dependent var	-0.036478
Adjusted R-squared	0.502438	S.D. dependent var	0.305428
S.E. of regression	0.215443	Akaike info criterion	0.058692
Sum squared resid	1.021143	Schwarz criterion	0.711767
Log likelihood	13.91419	Hannan-Quinn criter.	0.288932
F-statistic	3.596633	Durbin-Watson stat	2.592524
Prob(F-statistic)	0.003640		

APPENDIX 3: DIAGNOSTIC TEST RESULTS

Jacque-Berra residual normality test

Null hypothesis: Normally distributed errors

Series: Residuals	
Sample 1979 2015	
Observations 37	
Mean	-2.12e-16
Median	0.018994
Maximum	0.292102
Minimum	-0.242628
Std. Dev.	0.123969
Skewness	-0.100802
Kurtosis	2.545339
Jarque-Bera	0.381348
Probability	0.826402

Serial correlation test

Null Hypothesis: No serial correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.156282	Prob. F(2,20)	0.0644
Obs*R-squared	8.876553	Prob. Chi-Square(2)	0.0118

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 02/21/18   Time: 16:00
Sample: 1979 2015
Included observations: 37
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPUBLIC_GFCF(-1)	0.078531	0.137862	0.569635	0.5753
LNPUBLIC_GFCF(-2)	0.141216	0.157852	0.894610	0.3816
LNPUBLIC_GFCF(-3)	-0.018470	0.121545	-0.151959	0.8807
LNPUBLIC_GFCF(-4)	0.080924	0.126776	0.638326	0.5305
LNFDSGNI	0.047126	0.088272	0.533874	0.5993
LNFD_FLOWS	-0.024141	0.111769	-0.215988	0.8312
LNFD_FLOWS(-1)	-0.059141	0.128044	-0.461884	0.6491
LNTO	0.029919	0.212190	0.141002	0.8893
POP_GROWTH	-0.241477	0.280016	-0.862366	0.3987
POP_GROWTH(-1)	0.609770	0.713750	0.854318	0.4030
POP_GROWTH(-2)	-0.566816	0.708351	-0.800191	0.4330
POP_GROWTH(-3)	0.210667	0.281028	0.749629	0.4622
POLBCYCLE	-0.016636	0.081170	-0.204957	0.8397
C	0.527502	2.162544	0.243927	0.8098
@TREND	0.010819	0.014067	0.769072	0.4508
RESID(-1)	-0.491347	0.251711	-1.952030	0.0651
RESID(-2)	-0.509556	0.255922	-1.991063	0.0603

R-squared	0.239907	Mean dependent var	-2.12E-16
Adjusted R-squared	-0.368168	S.D. dependent var	0.123969
S.E. of regression	0.145005	Akaike info criterion	-0.720364
Sum squared resid	0.420529	Schwarz criterion	0.019788
Log likelihood	30.32673	Hannan-Quinn criter.	-0.459426
F-statistic	0.394535	Durbin-Watson stat	2.102749
Prob(F-statistic)	0.968053		

White test for heteroskedasticity

Null hypothesis: No heteroskedasticity (homoskedasticity)

Heteroskedasticity Test: White

F-statistic	1.420058	Prob. F(14,22)	0.2240
Obs*R-squared	17.56389	Prob. Chi-Square(14)	0.2274
Scaled explained SS	4.797958	Prob. Chi-Square(14)	0.9884

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/21/18   Time: 16:08
Sample: 1979 2015
Included observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.271565	0.122210	2.222109	0.0369
LNPUBLIC_GFCF(-1)^2	0.001231	0.003147	0.391014	0.6995
LNPUBLIC_GFCF(-2)^2	-0.002651	0.003501	-0.757169	0.4570
LNPUBLIC_GFCF(-3)^2	0.003938	0.003150	1.250189	0.2244
LNPUBLIC_GFCF(-4)^2	-0.005525	0.002699	-2.046988	0.0528
LNFDSGNI^2	-0.005244	0.004454	-1.177395	0.2516
LNFD_FLOWS^2	-0.000174	0.000358	-0.486377	0.6315
LNFD_FLOWS(-1)^2	-0.000489	0.000381	-1.284907	0.2122
LNTO^2	0.000487	0.003414	0.142591	0.8879
POP_GROWTH^2	0.003773	0.002849	1.324585	0.1989
POP_GROWTH(-1)^2	-0.009272	0.006104	-1.519034	0.1430
POP_GROWTH(-2)^2	0.008653	0.005744	1.506394	0.1462
POP_GROWTH(-3)^2	-0.003248	0.002374	-1.367712	0.1852
POLBCYCLE^2	-0.008176	0.009746	-0.838954	0.4105
@TREND^2	-8.63E-06	1.37E-05	-0.629778	0.5353

R-squared	0.474700	Mean dependent var	0.014953
Adjusted R-squared	0.140418	S.D. dependent var	0.018845
S.E. of regression	0.017472	Akaike info criterion	-4.965545
Sum squared resid	0.006716	Schwarz criterion	-4.312471
Log likelihood	106.8626	Hannan-Quinn criter.	-4.735306
F-statistic	1.420058	Durbin-Watson stat	2.018418
Prob(F-statistic)	0.223992		

Ramsey RESET test

Null Hypothesis: Residuals are white noise

Ramsey RESET Test
Equation: UNTITLED
Specification: LNPUBLIC_GFCF LNPUBLIC_GFCF(-1) LNPUBLIC_GFCF(
    -2) LNPUBLIC_GFCF(-3) LNPUBLIC_GFCF(-4) LNFDSGNI
    LNFD_FLOWS LNFD_FLOWS(-1) LNTO POP_GROWTH
    POP_GROWTH(-1) POP_GROWTH(-2) POP_GROWTH(-3)
    POLBCYCLE C @TREND
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.111498	21	0.2789
F-statistic	1.235427	(1, 21)	0.2789

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.030740	1	0.030740
Restricted SSR	0.553260	22	0.025148
Unrestricted SSR	0.522520	21	0.024882

Unrestricted Test Equation:
Dependent Variable: LNPUBLIC_GFCF
Method: ARDL
Date: 02/21/18   Time: 16:17
Sample: 1979 2015
Included observations: 37
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic):
Fixed regressors: C @TREND

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNPUBLIC_GFCF(-1)	-0.012685	0.161158	-0.078712	0.9380
LNPUBLIC_GFCF(-2)	-0.011777	0.261061	-0.045111	0.9644
LNPUBLIC_GFCF(-3)	0.031305	0.216689	0.144468	0.8865
LNPUBLIC_GFCF(-4)	-0.010097	0.490160	-0.020600	0.9838
LNFDSGNI	0.063989	0.360045	0.177725	0.8606
LNFD_FLOWS	-0.009777	0.160218	-0.061025	0.9519
LNFD_FLOWS(-1)	0.005387	0.192125	0.028037	0.9779
LNTO	-0.140141	1.273121	-0.110077	0.9134
POP_GROWTH	-0.003292	0.350495	-0.009392	0.9926
POP_GROWTH(-1)	0.011005	1.277338	0.008615	0.9932
POP_GROWTH(-2)	0.002920	1.505963	0.001939	0.9985
POP_GROWTH(-3)	-0.004242	0.730318	-0.005809	0.9954
POLBCYCLE	-0.030544	0.131040	-0.233087	0.8180
C	1.403575	5.300716	0.264790	0.7938
@TREND	0.007119	0.078038	0.091220	0.9282
FITTED^2	0.250854	0.225690	1.111498	0.2789

R-squared	0.885393	Mean dependent var	2.060638
Adjusted R-squared	0.803531	S.D. dependent var	0.355873
S.E. of regression	0.157740	Akaike info criterion	-0.557268

Sum squared resid	0.522520	Schwarz criterion	0.139345
Log likelihood	26.30946	Hannan-Quinn criter.	-0.311679
F-statistic	10.81570	Durbin-Watson stat	2.600200
Prob(F-statistic)	0.000001		

*Note: p-values and any subsequent tests do not account for model
    selection.