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The Relationship Between Public External Debt and Private Investment in Zimbabwe (1980-2016)

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This dissertation is submitted to the Department of Economics in partial fulfilment of the requirements for the Bachelor of Commerce in Economics (Honours) Degree at Midlands State University, Gweru, Zimbabwe

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SUPEVISOR'S APPROVAL FORM

The undersigned certify that they have supervised Chipunza Johannes' dissertation entitled:

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Chapter ONE   ....

Chapter TWO   ....

Chapter THREE   ....

Chapter FOUR   ....

Chapter FIVE   ....

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The undersigned certify that they have supervised, read and recommend to the Midlands state University for acceptance, a project entitled, " The relationship between public external debt and private investment in Zimbabwe (1980-2016)", submitted by Chipunza Johannes (R147114A) in partial fulfilment of the requirements of the Bachelor of Commerce (Honours) Degree in Economics.

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I, Chipunza Johannes Registration number A.T R147114A do hereby declare that this project is an original copy of my own work and has not been published before or submitted to any other institution/university.

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This dissertation is submitted in partial fulfilment of the Bachelor of Commerce Honours Degree in Economics at Midlands State University. The ideas in this dissertation represent solely those of the author. Therefore, the University, Economics Department and the Supervisor are not liable for errors and mistakes in this dissertation.

DEDICATION

This dissertation is dedicated to my mother, Lynette Hoyi for her unbound and unconditional support towards my academic journey. You have turned this dream into a reality. I gratefully thank you for the financial and emotional support. Utmost dedications also go to my lovely sisters Johanna, Paidamoyo and Tawonashe. I thank you all for the unconditional love and care. Special dedications also go to my grandfather Jackson Hoyi who has been a fundamental source of motivation and guidance.

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ABSTRACT

Progressive public indebtedness in Zimbabwe particularly in the form of foreign financing has culminated into debt distress in the nation. The country has accumulated stocks of unpaid public foreign debts over the years and as a consequence debt burden began to develop in the nation. Apparently such accumulation of external debt stocks is posited to lead to debt overhang and determent of private investment. As such this research study examined the relationship between public external debt and private investment in Zimbabwe over the period 1980-2016. The study regressed private investment (PINV) on current external debt (EXD), past external debt (LAGEXD), public investment (PUBI), household final consumption expenditure (HFCE), debt servicing (DEBTSERV), trade openness (TO) and real interest rate (R). The study aimed at addressing whether external debt accumulation (debt overhang) deters investment and also addressing the crowding out role of external indebtedness on private investment. The study found a negative relationship between public external indebtedness and private investment. Both current and past external debt flows were seen to deter private investment although current debt flows were seen to have insignificant influence on private investment. However, debt service was found to promote private investment. The study therefore concluded that the existence of debt overhang as a consequence of the accumulation of past external debt stocks is discouraging private investment into the economy. The study recommend on the formulation of policies aimed at increasing national savings at the same time reducing public sector access to foreign lending such that private sector confidence in the economy can be promoted. Also, policies that maintain desirable servicing of the external debts can mitigate the negative effects of debt accumulation on private investment.

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LIST OF ABBRVIATIONS

ADF	Augmented Dickey Fuller
BPG	Breusch-Pagan-Godfrey
CLRM	Classical Linear Regression Model
DW	Durbin-Watson
ESAP	Economic Structural Adjustment Programme
EVIEWS	Econometric View
GDP	Gross Domestic Product
GNP	Gross National Product
GFCF	Gross Fixed Capital Formation
HIPC	Highly Indebted Poor Country
IMF	International Monetary Fund
LDC	Less Developed Country
OLS	Ordinary Least Squares
RBZ	Reserve Bank of Zimbabwe
WAMZ	West African Monetary Zone
ZIMSTAT	Zimbabwe National Statistical Agency

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

External debt has progressively become a major source of funding for the majority of developing nations most of whom do not have sufficient funds for capital formation (Abdullahi *et al,* 2016). Developing countries require supplementary foreign capital to bridge the resource gap and stimulate savings in capital formation. External debt in Zimbabwe has increased heavily owing to inadequate supply of local and foreign currency, high levels of consumption and low domestic savings (Bayai and Nyangara, 2013). Private Consumption in Zimbabwe was 76.42% of GDP in 2016 having had averaged at 73.08% of GDP from 1975-2016 (Global economy data). Gross domestic savings on the other hand stood at -1.818% of GDP having improved from -10.276% of GDP in 2015 (World Bank, 2017). This has emphasised the need for increased foreign financing. External debt as a ratio of GDP in Zimbabwe stood at 60.04% in 2016 having increased from 59.33% in 2015. This growth in the access of foreign credits has been aided by the high domestic debt burden in the country making the International community lender of last resort to Zimbabwe. The IMF (2016) has posited that the effects of external debt burden on the economy's private investment are emanating from debt distress and liquidity constraints related to servicing of the debt burden.

1.1 Background of the Study

Indebtedness in Africa can be traced as far back as the 1960s and 1970s where a host of African countries received foreign credit for political and economic stabilization purposes, in the post-independence era. The loans were meant for investment in economic development and social equity, Colgan (2001). In the 1970s, loans were received from western banks which had experienced revenue surpluses during the oil crisis. However, the loans were made with little regard to the debtor nation's ability to repay and inevitably led to the debt crisis of 1980s period due to the accumulation of unpaid debt and growing debt servicing costs, Nkamleu (2006). The development of the debt crisis in the 1980s was aided by the shocks of the 1973 oil crisis and rising world interest rates.

According to Colgan (2001), debt crisis in Sub Saharan Africa worsened in the 1980s as the ratio of continent's external debt to its GNP rose from 51% in 1982 to 100% in 1992. Consequently, the region's debt grew to four times its export receipts in the early 1990s. In

1998, debt stock in the region was estimated at $236 billion, whilst that of the whole African continent was over $300 billion. By 2001, external debt burden in Africa was estimated to be twice that of any other region in the world carrying 11% of the developing world's debt. This reflects a situation of high debt distress in developing nations as theyfail to effectively manage and service their external debt stocks.

The first approach to address the issue of growing debt burden in low income countries was the inauguration of the Highly Indebted Poor Country (HIPC) initiative in 1996. The initiative was introduced to assist developing countries with debt management and servicing. The HIPC initiative aimed at reducing debt overhang and restore sustainability of the debt of eligible nations. Debt relief was offered through debt restructuring, rescheduling and debt forgiveness.

Zimbabwe has over the years accumulated an external debt burden through the restructuring of its debt and access to new financing. Accumulation of arrears as a result of debt rescheduling has also contributed massively to the prevailing debt crisis due to increasing interest payments. Debt rescheduling was administered to the nation as it failed to meet its debt obligations due to falling export revenues aided by the withdrawal of foreign investment, IMF (2017). The IMF (2016) has acknowledged that Zimbabwe has failed to receive debt relief under the HIPC initiative as the country does not qualify as a highly indebted poor nation thereby contributing to the ever-growing external debt stocks. This has promoted the development of debt distress in the nation as shown by the external debt indicators in the Figure 1.1;
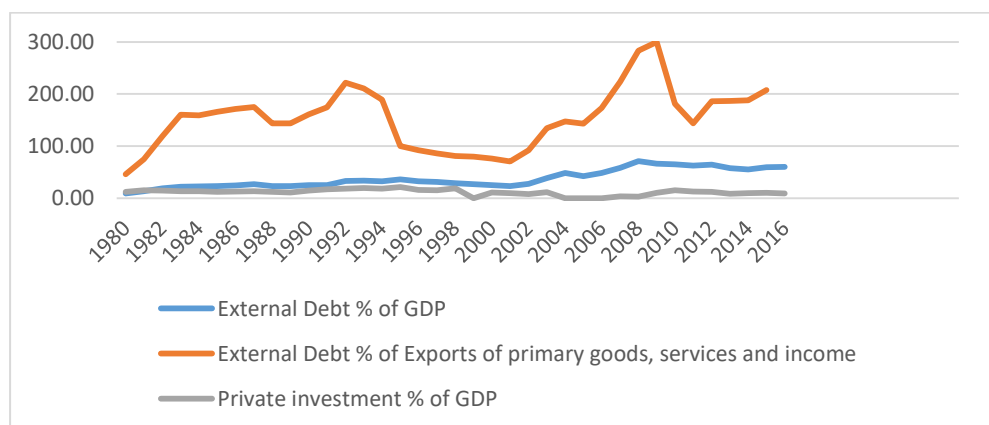
Figure 1.1: Trend of External debt indicators and Private Investment in Zimbabwe from 1980-2016.

Source: *World Bank (2017)*

Figure 1.1 shows an unattractive situation where external debt occupies high percentages of GDP and export income. External debt as a percentage of exports of goods, services and income has increased from 45.8% in 1980 to 207.5% in 2015. This growth in the ratio depicts debt servicing constraints where majority of export receipts are used to clear the foreign credits. During the 1980s decade, an average of 30% of Zimbabwe's exports where spent on debt repayment causing a lot of resources and foreign currency to flood out of the country, (Jones, 2011).

External debt is that part of total public debt in a nation representing arrears to foreign creditors, (Akomolafe *et al*, 2015). defined as debt the as a percentage of GDP has increased overally from 9.33% in 1980 to 60.04 in 2016 signalling the development of debt distress in the nation. Adegbite *et al* (2008) posited that the higher the ratio of a nation's debt stock to its output (GDP), the greater the debt burden. The increase in debt burden has been attributed by Saungweme *et al*, (2016) to poor debt management and poor budgetary control.

Private investment on the other hand has not shown much positive growth. The trend in private investment reflects a rather fluctuating and unstable pattern over time. Having achieved independence in 1980, private investment in Zimbabwe increased from 12.31% of GDP to 15.18% of GDP in 1981 (World Bank 2017). This increase was due to the introduction of intervention policies by the State which aimed at shaping the growth path for private investment, (Makuyana, *et al,* 2014). However, by 1989, private investment had reduced to 10.76% of GDP (World Bank data). The decline of private investment during the 1980-1990 decade in developing nations has been attributed to the emergence of the debt crisis in the mid-1980s facilitated by the growth of public expenditures (Iyoha, 1999).

The growth of private investment in the 1990s era was attributed to the adoption of Economic Structural Adjustment Programme (ESAP) which promoted the privatization of state enterprises (Makuyana, *et al,* 2014). However, the negative growth of private investment up to 2008 has been accredited by Makuyana *et al*, (2014) to the impacts of the fast track land reform policy, high inflation, high interest rates and unstable political environment. This has led to capital flight during this period. The low and weak growth of private investment after 2000 has been attributed by the IMF (2017) to massive liquidity constraints emanating from high debt service.

1.2 Problem Statement

Public indebtedness has been on the increase over the years due to the accumulation of unpaid foreign debts. This has ultimately led to the development of debt distress in Zimbabwe as shown by the external debt indicators in Figure 1.1. The external debt indicators portray an upward trend implying growth of debt burden in the nation. In contrast, private investment has declined on declined over the years. This divergence between external debt and private investment poses serious consequences for economic growth as private investment is regarded as the major driver of economic growth.This therefore warrants a research on the nature of the relationship between external debt and private investment in Zimbabwe.

1.3 Objectives of the Study

The main objective of the study is to undertake an empirical investigation of the relationship between public external debt and private investment. Specifically, the study seeks:

- To analyse how external debt and private investment are related by considering the role of debt overhang and crowding out effects on private sector capital formation.

- To provide policy recommendations.

1.4 Research Hypothesis

The study will seek to test the following hypotheses

1. H_0: External debt has no effects on private investment

   H_1: External debt fully affects private investment

2. H_0: debt overhang effects do not reduce private investment

   H_1: debt overhang effects reduce private investment

3. H_0: debt service payment does not crowd-out private investment

   H_1: debt service does crowd-out private investment

1.5 Significance of the Study

There is enormous empirical literature on debt distress in Africa complimented by IMF and World Bank publications. However most of these empirical studies have focused on the external debt-economic growth nexus rather than the linkage between external debt and private investment, for example; Iyoha (1999), Erhieyovwe, *et al* (2013), Siddique (2015) and

Ijirshar, *et al.* (2016), to name a few. Very few studies have however explicitly explored the impacts of external debt on private investment. Some of the studies include the works of Apere (2014), Akomolafe *et al.* (2015) and Abdullahi (2016).

Nonetheless, the most alarming factor is that the bulk of these studies have been performed outside Zimbabwe in countries like Nigeria and Kenya therefore creating an information gap. This study therefore seeks to address that information gap and offer more literature on debt distress in Zimbabwe. The study also seeks to address how external debt can be more efficiently managed in Zimbabwe therefore reducing its pressures on the fiscus. The study will also provide advice on how to stimulate private investment in the face of increasing external debt burden.

1.6 Limitations of the Study
Considering that the research study uses secondary data, some problems were encountered in terms of access and availability of the data. For example some incomplete data sets were collected from statistical institutions like the World Bank but were complemented by other agencies like ZIMSTAT and the RBZ. Also since data on actual levels of private investment is difficult to acquire, the study uses Gross Fixed Capital Formation (GFCF) as a proxy for private investment

1.7 Study Delimitations
The study uses time series data for Zimbabwe for the period 1980 to 2016.

1.8 Organization of the Rest of the Study
The rest of the research study is integrated in such a way that; Chapter Two gives a review of theoretical and empirical studies that have addressed the external debt-private investment relationship. Chapter Three follows by outlining the methodology used by the researcher in undertaking the econometric study. Chapter Four highlights the econometric procedures that were used for estimation and analysis. Chapter Five concludes the research by offering a summary on research findings and offering recommendations for future policy derivation and implementation.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter the study outlines the various theoretical and empirical abstractions on the relationship between external debt and private investment. The theoretical discuss on the external debt-private investment problem borders from the Two Gap model, Classical view, Keynesian theory, Debt overhang hypothesis and the Ricardian equivalence. The chapter further goes on to summarize some of the empirical works on the relationship between public external debt and private investment.

2.1 Theoretical Literature Review

Akomolafe *et al,* (2015) defines external debt as that part of total public debt representing debt owed by citizens of a nation to creditors outside the country. The traditional role behind public access to foreign debt accrues from its complementary role on domestic savings in capital formation. However, there seems to be no unanimous consensus on the relationship between external debt and private investment from theory.

The basic idea of foreign financing is derived from the Two Gap model which posits that external finance supplements domestic resources in capital formation. The Two-Gap model is an extension of the Harrod-Domar model of investment and growth which states that investment (I) is a direct function of savings (S), such that: $S = I$. Harrod (1939) and Domar (1946) advocated that the amount of money invested today is equal to the amount of money saved today and that the growth rate is dependent upon the savings rate. That is,

$$g = \frac{s}{k} \qquad\qquad (2.1)$$

Where *g* is growth rate, *s* is the savings rate and *k* is the capital to output ratio.

In equation 2.1 above, high growth rates are achieved through the availability of high domestic savings. Chenery and Strout (1966) therefore augmented the Harrod-Domar model to explain the complimentary role of foreign savings (external debt) on domestic savings. The Two Gap model posits that developing nations face two gaps namely the savings gap and trade gap (also referred to as foreign exchange gap). The savings gap is the difference between available savings and desired level of investment whereas the foreign exchange gap

is the difference between imports (outflow of foreign currency) and exports (inflow of foreign currency).

Foreign capital inflows therefore act as a bridge within which insufficient domestic savings and foreign currency are complemented to allow for higher levels of investment as shown by equation 2.2 below:

$$E = Y = I - S = M - E = F \hspace{3cm} (2.2)$$

Where E = National Expenditure, Y= National Output or Income, I= Investment, S= Savings, M= Imports, E= Exports and F= Foreign Capital Inflows

In equation 2.2, foreign capital inflows eliminate the foreign exchange gap by allowing new investment projects to be implemented, allowing the importation of capital goods and technical assistance (Forgha *et al.*2014). Elimination of the savings gap promotes investment and growth. In this case the growth rate would be determined by both domestic savings and foreign capital as shown by the equation below;

$$g = \frac{s}{k} + \frac{f}{k} (2.3)$$

Where f= foreign savings (foreign debt) and s, g and k are as explained before.

Thus, from equation 2.3 it can be observed that an increase in foreign debt inflows adds to the domestic supply of savings which therefore stimulates investment and growth.This is supported by Akomolafe *et al.* (2015) who found external debt to promote investment.

Were (2001) also established the existence of a positive relationship between external debt and private investment, but in the short run through current debt flows. This study therefore expects to find a positive relationship between current external debt and private investment.

The theory has however been criticized by Forgha*et al.*(2014) for not taking into consideration the distribution of the borrowed funds and their subsequent utilization. The authors argue that distribution of the foreign credit towards unproductive investments like political campaigns, purchase of luxurious vehicles, houses and serving of wage bill may not necessarily stimulate investment and growth. These arguments also align with the arguments put forward by the classical theory.

Classical theorists like Ricardo and Smith seem to be predominantly unfavourable to public borrowing as they propose a *laisez fare* market system where economic activity is run by

private individuals. They denounce public expenditures as being unproductive and inefficient as resources are ultimately wasted by the public sector relative to private investors. The classical theorists blame state indebtedness for diverting resources from the productive private sector to the non-productive public expenditures like the traditional roles of national defence, diplomatic ties and public order. The classical school argued that state indebtedness distorts private sector capital formation thereby negatively affecting the accumulation of capital and overall economic development.

Smith (1936) for example denied the state's right to incur debt arguing that indebtedness delayed the natural process of wealth creation and prosperity within the nation by diverting resources away from the private sector towards the financing of public expenditures that do not bear any hope of future production (Bilan, 2016). Modighiani (1961) also posited that public debt is an intergenerational burden that leads to progressive depletion of the capital outlay for the future generation, that is, debt burden is hereditary. This is supported by the Loanable funds theory which states that a substantial increase in public access to loanable funds would decrease the amount of funds available to potential private investors. This therefore implies that increased access to foreign debt would decrease private access to foreign credit thereby ultimately crowding out private investment.

Ricardo, together with other classical economists like Adam Smith, expressed fears of capital flight as a result of excessive taxation for debt service, (Churchman, 2001). Ricardo (1960) made two standing points that is, under no conditions should public expenditures be financed by public borrowing and that immediate debt redemption was crucial. The classical theory therefore attribute a negative relationship between public external debt and private investment. This is supported by Iyoha (1999) who found external debt to depress capital formation. This has however been argued against by Keynesian theorists who argue that external indebtedness assists the economy in gaining momentum after experiencing a recession. They therefore vote for public indebtedness as a tool for stimulating aggregate consumption and investment in the economy.

The school attaches an optimistic role to public sector deficit financing through government borrowing as a means for the regulation of economic activity precisely through aggregate demand. The school gave high prominence to the derivation of demand side policies as a means of financing economic recovery from a recession (Bilan, 2016). This lies on parallel ground to the classical connotations on public indebtedness.

Some empirical researches by Bayai and Nyangara (2013), and Abdul Rashid have proved that public investment crowd's in private investment. These results are in conjunction with the Keynesian view of public debt and investment. As such, public indebtedness is viewed as an indispensable tool for balanced growth in the economy.

Despite advocating for the positive impact of public indebtedness on economic recovery from a recession or stagnation, some Keynesians worry that persistent public loans into the long term may ultimately be problematic. According to Filip (2010), Beveridge, in his systematic deficit theory, admitted that ''getting out of the crisis is based precisely on public loans to finance an increase in government spending and therefore a budget deficit'', after which the state budget must be restored to equilibrium. Keynes (1982), in this regard, posited that it is possible to pursue favourable levels of aggregate demand and employment using budget deficits for the budget will correct itself and debt will be reduced. Keynesian theory attributes a positive relationship between public external debt and private investment.

The Keynesian perspective is however viewed by modern day conventionalists like Krugman (1988) and Elmendorf and Mankiw (1998) to be a short run phenomenon. They argue that in the long run, the classical connotations are evident.

Modern day economist have developed a new faith in which they hold fast to both the principles of both the Classical and Keynesian schools of thought. Covential theorists, as portrayed by Bilan (2016), separate their propositions in terms of time horizons, that is short run and long run. This new faith has been conveniently term the "conventional view" because it combines both the Keynesian support for public indebtedness and the classical disapproval for public borrowing to stimulate economic activities in the long term (Bilan, 2016).

The conventionalists believe that in the short run, the Keynesian propositions apply but however continued and unsustained growth of public indebtedness will lead to the eventual crowding out of private investment, falling growth rates and weakening economic performance, (Bilan, 2016).

Bilan (2016) attributes this conventional view to the works of Krugman (1988) and Elmendorf and Mankiw (1998). Although Krugman does offer respect for the Keynesian view of public expenditures by accepting that modern day economists have to accept that Keynesian economics remain the best framework for understanding recessions and depression, he also holds true to the fact that continued public indebtedness will eventually lead to debt distress and reduction of private capital and weakened economic performance.

The threshold relationship between external debt accumulation, and private investment and growth stems from the debt overhang theory by Krugman (1988). Krugman defined debt overhang as being a case where the external debt burden is so inherently large that foreign lenders cannot expect with full confidence to be fully repaid. Krugman (1988) further asserts that when the expected present value of potential resource transfers, say export earnings is less than the debt stock, then current debt service will be insufficient to fully cater for the actual, total debt stock thus creating disincentives for investment.

The theory was developed from the firm level debt overhang theory by Myers in 1977. Myers was looking at the debt overhang effect on firm level investment. Myers positioned that an unsustainable debt will force the firm to make promised payments to the creditors which must be serviced via the transfer of revenue streams. This transfer of cash flows was posited to ultimately lead to the decline in the firm's investment as the firm derails on intended investment projects. Ochhino (2010) notes that, ''a debt overhang distortion acts like a tax on the increase in the firm's value generated by new investment projects, and this may lead them to forego investment projects with positive net present values''.

Krugman therefore likened a debtor nation to something like a debtor firm, although he recognised that the parallel is not exact. Consequently, Krugman stated that the debtor nation will allocate some portion of its national income towards debt service allowing it to effectively manage its debt. The debt overhang theory however postulates that the accumulation of such debt burden will provide disincentives for investment as the debt acts as a tax on domestic private investors. The returns from local and foreign investors in the domestic economy are thus transferred (taxed away) to the creditors as debt repayment. This therefore makes private investment less lucrative thereby reducing the incentives for investment (Claessens *et al.,* 1996).

The secondary effects of debt overhang on private investment accrue as a result of poor credit ratings and reduced access to future borrowings. A debt overhang implies growing inability of the indebted nation to payback its debts which may discourage further lending which will then ultimately deter investment. Various scholars have established the existence of a non-linear, threshold relationship between external debt and private investment. These include: Apere (2014), Adegbite (2008) and Ayadi and Ayadi (2008). Apere (2014) postulated that the relationship between external and private investment is non-linear, where debt first promotes investment but however accumulation of external debt will end up discouraging private

investment. Thus the expected relationship between external debt and private investment entails a positive one in the short run (where current debt inflows crowd in investment) and a negative relationship in the long run where foreign debt accumulation is seen to crowd out private investment.

The Ricardian equivalence theory however argues against the aforementioned theorists by positing that the effect of public indebtedness leads to a neutral effect on private investment. Challenging the Keynesian ideology of public debt, Barro (1974) augmented Ricardo's (1960) views of the negative effects of public indebtedness on capital formation by promoting neutrality between tax financed and deficit financed government spending. Specifically, Barro (1974) posited that an increase in government borrowing (or reduction in taxation) today, will likely result in the accumulation of public debt which will have to be serviced at some point in the future. This will therefore force the government to increase future taxes so as to acquire revenue for future debt service.

The equivalence theory therefore attributes that as rational consumers can accurately predict future tax increases, an increase in government borrowing will lead to a rise in current private savings equal to the value of future taxes. This is so because instead of consuming or investing the extra revenue from the tax cut, rational private individuals will simply save for future tax payments, (Caron, 2007). Thus the positive effect arising from the Keynesian perspective is cancelled out thereby emphasising the neutrality of public debt.

2.2 Empirical Literature Review

A variety of empirical researches have been carried out since the onset of the debt crisis in the early 1980s. The main objective of these studies was to empirically assess the effects of external debt on private investment and/ or economic growth. There seems to be a lot of consensus on the existence of a rather negative relationship between external debt and private investment. As such, most empirical studies have either confirmed the existence of debt overhang or crowding out effects as shown below.

A research study by Jarju *et al.*(2016) investigated the relationship between external debt and economic growth in the West African Monetary Zone (WAMZ) using panel data analysis for the period 2000-2014 and concluded that there exist significant debt overhang and crowding out effects of external debt on economic growth and investment in the region. The study used both a fixed effects model and a random effects model. External debt stock was found to negatively affect economic growth in both models thereby proving the existence of a debt

overhang. Debt servicing also negatively affected growth in both models entailing the existence of a crowding out effect which implied that resources were diverted from productive investments and channelled towards debt servicing thereby reducing growth. This aligns with Ricardo's (1960) tax incidence connotations.

An empirical study by Akomolafe *et al.*(2015) researched on the relationship between public debt and private investment in Nigeria using time series data for the period 1980-2010. The study divided public debt into domestic debt and external debt. Private investment was then regressed on domestic debt, external debt, real interest rate and real GDP. The study then implemented a Vector Error Correction Model (VECM) to address the long run relationship between the variables. Results from the normalized cointegrating equation supported the Two Gap model by establishing a positive relationship between external debt and investment in the long run where a 10% increase in external debt would lead to a 2% increase in Gross Domestic Investment. External debt was however found out to crowd out investment in the short run. Domestic debt on the other hand was found out to crowd out investment in both the short run and long run.

A research study by Apere (2014) also investigated the effects of total public debt on private investment in Nigeria using a non-linear model where private investment was regressed on domestic debt, domestic debt squared, external debt, external debt squared, and private consumption expenditure as a percentage of GDP. The study used time series data for the period 1980-2012. The relationship was estimated using the instrumental variables technique and boot strapping technique for the estimation of standard errors for the turning points. Domestic debt was found to have a linear but positive relationship with private investment. External debt was found to have a turning point of 124.69%. Apere concluded that ''unless external debt as a ratio of GDP reaches some threshold value (124.69%) that is large enough for meaningful investment, the impact of external debt on private investment in Nigeria will always be negative''. Apere (2014) therefore highlighted the existence of a debt overhang in Nigeria.

Applying an endogenous growth model in studying the relationship between public external debt and growth (Casares, 2015) finds a non-linear but U-shaped relationship between debt and growth in Mexico. The results are consistent with the findings of Cohen (1983) and Sachs (1986) which are also in line with the debt overhang theory. Casares states that beyond a certain level, public external debt becomes unsustainable such that increases in the external

public debt will lead to a subjective increase on the country's risk premium and interest payments such that domestic savings decline thereby ultimately leading to a reduction of capital formation. Therefore, Casares like Apere (2014) also established a debt overhang relationship between external debt, capital accumulation and growth.

A study by Hunte (2003) found out that debt servicing has contributed to the decline of domestic savings and investment in Sub-Saharan African countries. This was supported by Easterly (1999) who postulated that the provision of debt relief without sufficient improvement in the domestic saving culture may be ineffective in eradicating debt distress in highly indebted countries.

An empirical investigation by Chaudhry *et al.*(2009) investigated the impact of foreign debt on savings and investment in Pakistan using time series data for the period 1973-2006. The study utilized a Vector Autoregressive (VAR) model and found partial evidence that foreign debt had contributed favourably to domestic savings and investment in Pakistan. The study recognized that some portion of external debt has been channelled towards consumption rather than investment expenditures thus the limited positive effect on investment and growth in the economy.

A study by Adegbite*et al.* (2008) examined the impact of Nigeria's external debt on economic development. The study implemented both linear and non-linear simultaneous models for economic growth and private investment. The study used generalized least squares to estimate both the non-linear growth and private investment models. The non-linear growth model was found to suffer from serial autocorrelation rendering parameter estimates inefficient. The non-linear private investment model was found to be fit for data analysis as shown by the absence of autocorrelation. In the model private investment was regressed on the traditional debt burden indicators, that is, external debt ratio of GDP and debt service ratio of exports. External debt squared was found to have a non-linear effect on private investment thereby proving the existence of a debt overhang. Debt servicing was also found to crowd out private investment.

An empirical research by Chowdhury (1994) used a structural simultaneous equation model to capture the relationship between external debt, capital accumulation and outputin selected developing countries of the Asia and Pacific regions. The study used panel data for the period 1970-1988 and found out that external debt had a direct and substantially large effect on Gross National Product (GNP) whereby a 1% increase in external debt would raise GNP by

0.24% in the Asia-Pacific region. On the other hand, debt was found as having an indirect effect on GNP by lowering private investment. The indirect impact of crowding-out private investment was observed to be substantially larger than the direct effects.

An empirical study by Iyoha (1999) which modelled the macroeconomic impacts of external debt on economic growth in Sub-Saharan Africa concluded that there exist significant debt overhang and crowding-out effects in the region. The study used simultaneous equation models for output and investment demand. Huge stocks of external debt and high debt servicing were found to depress capital formation, features of debt overhang burden and crowding out effects respectively.

Another study by Mjema (1996) also analysed the impacts of foreign debt on economic growth in Tanzania using simultaneous equation models. The scholar observed that debt service had a negative impact on growth. Amoating and Amoaku-Adu (1996) observed that if a greater proportion of export earnings is used to service external debts, then little foreign currency will be made available for investment. This therefore subscribes to the classical disregard for public access to foreign debt.

Investigating the impact of external debt on economic growth in Kenya,Were (2001) implemented a simultaneous equation model for the time period 1970-1995. The study used simultaneous equations for growth and investment. In the growth equation, current debts stocks had a negative coefficient implying that an increase in current debt stocks would lead to a decline in economic growth. Current debt flows had however, a positive impact on private investment in the investment equation. Were concluded that foreign debt supplements domestic resources in capital formation, if used productively. External debt accumulation had a negative impact on private investment thereby implying the existence of a debt overhang. Current debt servicing was found to lead to the crowding out of private investment.

Some studies have failed to estimate a clear relationship between external debt and domestic investment levels. With some authors like Forgha *et al.*(2014) finding unclear results. The direction of external debt in Cameroon was found to be unclear as most of the funds were presumably spent on manpower training which was hugely undermined by the existence of high levels of unemployment and brain drain (Forgha *et al.*, 2014).In their study they recognise that external debt is channelled towards unproductive expenditures. They also concur that corruption and embezzlement, and capital flight affective greatly the productivity of the foreign loans.

However, some empirical studies have found evidence of the crowding in of private investment as a result of increased debt service. Bayai and Nyangara (2013) in their study of the determinants of private investment in Zimbabwe for the period 2009-2011 found a rather positive relationship between external debt service and private investment. In their original model of private investment, the study included independent variables like rate of inflation, interest rate, savings rate, trade terms, GDP, political risk, public investment and debt service. After using the forward stepwise model fitting technique, savings and inflation rates were found to have insignificant influences on private investment. Results from the fitted model produced a positive relationship between external debt service and private investment whereby a 1% increase in the level of debt servicing, was found to crowd in private investment by 4.42%.

A variety of increasing research studies have analysed the effect of foreign debt on private investment by rather addressing its role on capital flight. A growing proportion of these studies have confirmed the existence of a ''revolving door'' hypothesis where external debt comes into the country as some form of capital but simultaneously leave in the form of private capital flight (Ajilore 2005; Chipalkatti and Rishi 2001)

2.3 Conclusion

Theories of public access to foreign financing have offered diverging views on the relationship between external debt and private investment. As such empirical literature has consequently produced diverging conclusions on the nature of the relationship between external debt and private investment. However, despite lack of such unanimous consensus, most recent empirical studies have subscribed to the Debt Overhang Theory and confirmed the existence of both a positive and negative relationship, in the short run and long run respectively. These include Were 2001; Apere 2014; Casares 2015 andAdegbite *et al.,* 2008,to name a few. Despite the growing external debt burden in Zimbabwe, little has been researched on its implications on the economy's investment levels. The study therefore seeks to bridge that information gap provide more evidence on the effects of external debt on investment in the country. The study therefore adapts an empirical model from the reviewed literature which will ultimately be specified and clearly justified in the succeeding chapter.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter highlights the methodology used in the study. The chapter starts off with the specification of the empirical model adopted, then goes to justify the inclusion of selected variables and finally highlights the diagnostics checks done to ensure that the model is fit for regression analysis.

3.1 Model Specification

The main aim of the model is to determine the relationship between external debt and private investment in Zimbabwe. As such, the study adapted a model from Apere (2014) where private investment is regressed on domestic debt, external debt and private final consumption. The model for this study added other variables that influence private investment such as real interest rates and trade openness to effectively capture the determinants of private investment (Were 2001). External debt lagged by one period (LAGEXD) is adopted from Were (2001) to capture the effects of past debt accumulation on private which is used to proxy debt overhang. Domestic debt variables were removed from the model since the objective of the study is to focus on the foreign aspect of public debt. The model will be as follows:

$$PINV = \beta_0 + \beta_1 EXD + \beta_2 LAGEXD + \beta_3 PUBI + \beta_4 DEBTSERV + \beta_5 HFCE + \beta_6 TO + \beta_7 R + U_t$$

Where;

β_0 is the intercept term representing autonomous investment, U_i is the stochastic error term

PINV is private investment as percentage of GDP represented by gross fixed capital formation in the private sector

EXD is external debt as percentage of GDP

LAGEXD is external debt as percentage of GDP lagged by one period to measure impact of past debt flows that is, the accumulation of debt stocks (the variable is used as a proxy for debt overhang)

PUBI is public investment as percentage of GDP

DEBTSERV is debt service measured by interest payments of external debt as percentage of exports of goods and services capturing the crowding out effects

HFCE is household final consumption expenditure as percentage of GDP, formerly private consumption expenditure

TO is trade openness measured as ratio of sum of imports and exports to GDP

R is the real lending rates

$\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, $\beta 5$, $\beta 6$, $\beta 7$, and $\beta 8$ are the coefficients of the explanatory variables in the model.

3.2 Measurement and Justification of Variables

3.2.1 Private Investment (PINV)

Private investment is defined by Chibber and Leechor (1993) as investments by private investors on new buildings, plant and equipment that are used in the production of goods and services. Akomolafe *et al.,* also describe private investment as the change in the value of fixed assets plus the change in stocks of private firms. The model above specifies private investment to be the dependent variable. Generally, literature adopts Gross fixed capital formation, in the private sector as a proxy for private investment, (Apere, 2014). As such, private investment covers gross outlays by the private sector on additions to its fixed domestic assets (IMF). This study therefore used Gross fixed capital formation by the private sector, as a percentage of GDP to represent private investment.

3.2.2 External Debt (EXD)

External Debt is that part of a nation's total debt that is owed to foreign creditors, (Akomolafe *et al.*, 2015). Foreign debt is argued to provide desirable resources for financing profitable investment projects especially in developing nations because of their lack of sufficient savings for capital formation, (Hunt, 2007). The foregoing view is supported by the dual-gap concept which states that foreign capital allows developing nations to invest more than they save domestically (McKinnon, 1964). The study therefore used external debt as a percentage of GDP. The expected sign is positive.

3.2.3 External Debt Lagged (LAGEXD)

The ratio of external debt as a percentage of GDP lagged by one period measures the effect of past debt flows on private investment that is the effect of external debt accumulation on private sector capital formation. This variable was adopted from Were (2001) who divided

the effect of external debt on private investment by separating its influences using the time factor. Were (2001) posited that current debt flows (external debt to GDP ratio) stimulate investment whereas past debt flows (external debt lagged) deter private investment.

The study therefore expects a negative relationship between external debt lagged and private investment. Such a negative sign would imply the possibility of debt overhang.

3.2.4 Debt Service (DEBTSERV)

Debt service is another traditional indicator of indebtedness, measured by interest payments of external debt as percentage of exports of goods and services. Some empirical researches by Ayadi (2008) have used debt service ratio of exports as a proxy for debt service. According to Ijirshar *et al.,* (2016), debt service is done only with export earnings or further borrowing. The variable is added into the adopted model to capture the crowding out impacts of external debt on private investment. Krugman (1988) argues that a high debt servicing ratio implies growing distress on a country's fiscus as the nation depletes for example, its foreign currency reserves and export receipts to cater for the accumulated external debt. The study expects to find a negative sign.

3.2.5 Public Investment (PUBI)

There's a seemingly hot debate on how public investment influences private investment. Some argue that investment in public infrastructure by the central government crowds in private investment (Bayai and Nyangara, 2013). Also, Rashid (2006) investigated the linkages between public and private investment in Pakistan and found out that public investment crowd's-in private investment and both were complementary. Whereas other opponents argue that investment in public expenditures crowd out private investments as it reduces financial support for private enterprises and raises the domestic cost of borrowing, (Jayaraman, 2008). As such, the expected sign can either be positive or negative.

A negative sign signals crowding out of private investment whereas a positive sign implies that public investment drives private investment.

3.2.6 Household Fixed Consumption Expenditure (HFCE)

Formerly regarded as private consumption, the variable captures the amount that is consumed by domestic households on goods and services, rather than saved. The variable is expressed as a percentage of GDP. In the Harrod-Domar model of investment, the amount of money invested (I) is equal to the amount of money that is saved (S), ie $I = S$. Investment is postulated to be a function of savings. Logic therefore follows that an increase in the amount

of money spent on private consumption reduces savings thereby ultimately reducing private investment. The study therefore expects the sign to be negative.

3.2.7 Real Lending Interest Rate (R)

Real lending interest rate captures the cost of borrowing by the private sector. The variable is included in the model since most investments require borrowed capital. Under the Keynesian model of investment, capital formation is an inverse function of real interest rate. They argue state that an increase in the interest rate makes investment more expensive and less worthwhile. Thus, when the cost of borrowing rises, investment will fall. The expected sign is negative reflecting that high interest rates crowd-out private investment.

3.2.8 Trade Openness (TO)

Trade openness measures trade liberalization. The variable is expressed as the sum of imports and exports, as a percentage of GDP. A higher percentage is argued to be attractive to foreign investors, especially given a situation of growing exports and thus having a positive effect on net private domestic investment. The expected sign is positive.

3.3 Data Types and Sources

The study used secondary time series data which was presented in the form of percentages, for example private investment and external debt were expressed as ratios of GDP. The yearly time series data was therefore collected from both national and international institutions like the ZIMSTAT, World Bank, IMF, Trading Economics, Global Economy, Index Mundi and various RBZ and IMF publications, Secondary time series data normally suffers from measurement error and data smoothening practices. This was however mitigated by the adoption of data from reliable, credible, legitimate and authoritative sources.

3.4 Diagnostics Tests

To check whether a model is strong for data fitting and meaningful results can be acquired, a series of diagnostics checks are carried out. These checks include testing for unit root, autocorrelation, heteroscedasticity, cointegration and model misspecification.

3.3.1 Unit Root Test For Stationarity

To prevent spurious regression, a test for nonstationarity is required. Non-stationary time series provide meaningless results thereby regarding further inference meaningless also. To prevent this problem the study used the Augmented Dickey-Fuller (ADF) test for unit root.

The ADF test adopts lagged values of the variables in determining the level and order of integration, (Gujarati, 2004). If the variables are stationary at level they are regarded as being $I(0)$, but however if the variables are stationary after first difference are regarded as being $I(1)$, and so on. The hypothesis for unit root is;

H_0: time series is nonstationary that is, has a unit root

H_1: time series is stationary

If the ADF test statistic exceeds the test critical values, one therefore rejects the null hypothesis and concludes that the series is probably stationary.

3.3.2 Cointegration Test

Cointegration between variables is crucial for analysing the long run behaviour of the model when the stochastic variables have a common trend, (Gujarati and Porter, 2009). Cointegration exists when the linear combination between two non-stationary variables is stationary. The study utilized the Johansen cointegration test in checking for cointegration. The Johansen cointegration test is used since it applies effectively to a multivariate model. The hypothesis of the procedure is represented below;

H_0: there is cointegration

H_1: there is no cointegration

If the t-statistic is greater than the t-critical value, one does not reject the null hypothesis and conclude that cointegration does exist within the model.

3.3.3 Multicollinearity Test

The study will also test for multicollinearity which is the existence of correlation between exogenous variables of the model, (Gujarati, 2004). Multicollinearity will be tested using the correlation matrix. The correlation matrix finds the existence of correlated independent values. The test uses the r value to measure goodness of fit of the model. A correlation of 0.8 is perceived as strong and undesirable. In such a case the researcher can drop one of the correlated variables, and then test again whether the R-squared is still significant. The hypothesis of the test is;

H_0: there is absence of multicollinearity

H_1: there is presence of multicollinearity

The null hypothesis of the test is rejected if the pairwise correlation is in excess of 0.8.

3.3.4 Heteroscedasticity Test

Heteroskedasticity refers to the violation of the classical assumption of constant variance of the error term, that is, homoscedasticity (Gujarati, 2004). Simply put, heteroscedasticity is a case where the disturbance term varies with some independent variable. The presence of heteroscedasticity widens the confidence interval such that the t and F tests will produce inaccurate results. In such a case Weighted Least Squares (GLS) or General Method of Moments (GMM) will be the solution though simple solutions do exist. This study adopts the Breusch-Pagan-Godfrey (BPG) test in checking for heteroscedasticity. The hypothesis of the Breusch-Pagan-Godfrey test is as follows;

H_0: there is absence of heteroscedasticity

H_1: there is presence heteroscedasticity

At the 5% level of significance one does not reject the null hypothesis of no heteroscedastic error terms if the p value of the BPG test statistic is in excess of 0.05. Otherwise the error terms would be heteroscedastic.

3.3.5 Autocorrelation Test

Autocorrelation according to Gujarati (2004) refers to correlation between disturbance terms in the model. One consequence of autocorrelation between disturbance terms is widening of the confidence interval. As such, to prevent using a model struck with autocorrelation, the study will use the Breusch-Godfrey (BG) Serial Correlation test for autocorrelation. The BG test for autocorrelation adopts the following hypothesis

H_0: there is no serial autocorrelation

H_1: there is serial autocorrelation

At the 5% level of significance, one does not reject the null hypothesis of no autocorrelation if the p value is greater than 0.05. Otherwise one would conclude that the model probably suffers from the existence of autocorrelation.

3.3.6 Model Specification Test

Incorrect specification of the empirical model may yield incorrect results leading to inaccurate inferences for policy recommendations. Specification errors arise due to incorrect specification of the model which may result from over fitting and /or under fitting a model

and etc. The study adopted the Ramsey proposed RESET test in checking for model specification errors. The RESET test involves the following hypothesis;

H_0: the model is probably correctly specified

H_1: the model is probably misspecified

Using the significance level of 5% one does not reject the null hypothesis if the probability value of the RESET test statistic is in excess of 0.05. Otherwise the model would be incorrectly specified.

3.3.7 Normality Test

The Jarque-Bera normality test is used to assess whether the disturbance term is normally distributed with a mean of zero and constant variance. The research tests the following hypothesis;

H_0: the disturbances are normally distributed

H_1: the disturbances are not normally distributed

We do not reject the null hypothesis of normal distribution if the Probability value of the Jarque-Bera statistic is greater than 0.05.

3.5 Conclusion

This chapter involved a description of the methodology to be used by the researcher in identifying the nature of the relationship between public external debt and private investment in Zimbabwe. This involved first giving an outline of the model to be used in regression analysis in the following chapters and then giving a justification of the adopted variables. The chapter also highlighted the diagnostic tests to be carried out during econometric estimation and finalized by giving a preview of the types of data used and its subsequent sources. This chapter therefore formed the basis within which estimation, presentation, analysis and interpretation of data is going to be carried out in the following chapter.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESULTS

4.0 Introduction

The major thrust of economic research is the application of econometric modelling in addressing economic phenomenon so as to observe the relationship between two or more economic variables and offer sound policy recommendations. Theory itself must be validated by empirical data and findings so that it becomes a relevant picture of reality. The application of econometric modelling will allow the researcher to practically observe the relationship between public external indebtedness and private investment. This study therefore employs Ordinary Least Squares (OLS) technique in estimating the relationship between public external debt and private investment using EVIEWS 8 software. Preliminary diagnostics tests were carried out to ensure that the estimated results are accurate and desirable for policy analysis.

4.1 Summary Statistics

Variable	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
PINV	37	11.5746	12.9000	21.8800	0.21000	6.19541
EXD	37	35.6300	30.9100	70.6500	5.3700	20.5768
LAGEXD	36	34.9519	30.5900	70.6500	5.37000	20.4452
PUBI	37	10.1568	6.3600	69.9500	-2.1000	15.2809
DEBTSERV	37	23.3848	23.1500	40.5600	4.5700	9.7159
HFCE	37	65.7751	64.4500	119.4100	25.3100	20.1423
TO	37	53.1459	50.1100	77.6700	22.5700	16.8399
R	37	82.9984	39.4800	572.9400	4.2600	129.5064

See Appendix 4 for full details

All variables in the model are continuous. The dependent variable, private investment (PINV) has a mean of 11.5746 and a median value of 12.9. Its minimum value is 0.21 with a maximum of 21.88, associated with a standard deviation of 6.19541. External debt on the other hand has a mean of 36.63 and a median value of 30.91, with a minimum value of 5.37 and maximum value of 70.65. The maximum value of 70.65 implies high external debt burden on the economy's GDP. Past debt (LAGEXD) also has a high mean of 34.9519 and minimum and maximum values similar to those of current external debt flows (EXD). Public investment has a slightly lower mean of 10.1568 with a maximum of and a minimum of -2.1. The mean amount of debt service was 23.3848 with a maximum of 40.56 and a minimum of 4.7. Household consumption is high with a maximum final consumption of 119.41 and

minimum consumption of 25.31 with a standard deviation of 20.1423. Interest rate has the highest standard entailed by a maximum lending rate of 572.94 and a minimum of 4.26.

4.2 Diagnostic Tests

This section outlines the diagnostic tests that were carried out to ensure that the estimated model conforms to the assumptions of classical linear regression analysis. These include stationarity, homoscedastity, no autocorrelation, and normality in the distribution of residuals.

4.2.1 Unit Root Testing Results

The study employed the Augmented Dickey-Fuller test for unit root in estimating the stationarity of variables. DEBTSERV and PUBI were stationary at level whilst the rest of the variables were stationary after first difference. Table 4.1 therefore summarises the unit root tests for each individual variable in the model.

Table 4.2: ADF Unit Root Test Results

Variable	ADF Statistic	Critical Values		Order of Integration
DEBTSERV	-5.171543***	1%	-4.234972	I(0)
		5%	-3.540328	
		10%	-3.202445	
EXD	-8.92098***	1%	-2.632688	I(1)
		5%	-1.950687	
		10%	-1.611059	
HFCE	-8.257874***	1%	-2.632688	I(1)
		5%	-1.950687	
		10%	-1.611059	
LAGEXD	-8.826574***	1%	-2.634731	I(1)
		5%	-1.951000	
		10%	-1.610907	
PINV	-5.885158***	1%	-2.632688	I(1)
		5%	-1.950687	
		10%	-1.611059	
PUBI	-5.192703**	1%	-2.630962	I(0)
		5%	-1.950394	
		10%	-1.611202	
R	4.914022***	1%	-2.623688	I(1)
		5%	-1.950687	
		10%	-1.611059	
TO	-7.781079***	1%	-2.632688	I(1)
		5%	-1.950687	
		10%	-1.611059	

*implies significance at 10%, **significance at 5% and ***implies significance at all levels.*

Consult Appendix 2A for complete results

The stationarity tests in Table 4.1 reveal that all given variables except PUBI and DEBTSERV are stationary after first difference. All the variables were stationary at all levels of significance with the exception of PUBI which was stationary at 5% and 10% levels of significance evidenced by the presence of two asterisks. Since the model consists of non-stationary variables we must check for cointegration to prevent spurious regression.

4.2.2 Cointegration Test Results

The Johansen Cointegration test was utilized in checking for cointegration since the majority of the variables were non-stationary at level. The presence of cointegration reveals the existence of a long run relationship in the model. In such a case OLS would not produce spurious results. Table 4.2 presents the results from the Johansen cointegration test.

Table 4.3: Johansen Cointegration Test Results

Hypothesized No. Of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.826896	182.9607	125.6154	0.0000
At most 1*	0.759074	121.5754	95.75366	0.0003
At most 2*	0.543796	71.76117	69.81889	0.0347
At most 3	0.493093	44.29268	47.85613	0.1010
At most 4	0.319111	20.51272	29.79707	0.3387
At most 5	0.119433	7.060273	15.49471	0.5706
At most 6	0.071823	2.608662	3.841466	0.1063

denotes number of cointegrating equations. See Appendix 2B for full results

The Johansen cointegration trace test predicts 3 cointegration equations at the 5% level of significance since the trace statistic exceeds the test critical values at the none, at most 1 and at most 2 cointegrated equations. The study therefore that a long run relationship does exist within the model. Ordinary least Squares regression method can therefore be applied.

4.2.3 Multicollinearity Test Results

The existence of high correlation between independent variables makes it difficult to analyse the extent to which each individual regressors influence the explained variable. The study therefore adopts the correlation matrix in analysing for the presence of multi-correlation within the model. A correlation of 0.8 and above shows the existence of high multicollinearity between the independent variables. Whereas a correlation below 0.8 is deemed acceptable for regression analysis (Gujarati, 2004). Table 4.2 presents the correlation matrix.

Table 4.4: Correlation Matrix Results

	EXD	LAGEXD	PUBI	DEBTSERV	HFCE	TO	R
EXD	1						
LAGEXD	0.6328	1					
PUBI	0.3499	0.2777	1				
DEBTSERV	-0.2815	-0.2338	-0.0125	1			
HFCE	0.1579	0.2050	0.4635	-0.4856	1		
TO	0.4777	0.4922	0.2750	0.0141	0.4039	1	
R	0.4138	0.3470	0.6493	0.0475	0.2543	0.3862	1

For full results consult Appendix 2C

The results from the pairwise correlation matrix signify the existence of moderate to weak multicollinearity between the exogenous variables. The pairwise correlation between all variables lies below 0.8 and as such the researcher adopts the do nothing approach as prescribed by Gujarati (2004).

4.2.4 Heteroscedasticity Test Results

The study utilized the Breusch-Pagan-Godfrey test in checking for the presence of heteroscedastic error terms. The test provided satisfactory results as shown in table4.4

Table 4.5: Breusch-Pagan-Godfrey Test Results

F statistic	0.414792	Prob. F(7,28)	0.8849
Obs*R-squared	3.382364	Prob. Chi-square(7)	0.8475
Scaled explained RSS	1.766958	Prob. Chi-square(7)	0.9716

See Appendix 2D for full results

The Breusch-Pagan-Godfrey test provided satisfactory results as depicted in Table 4.4. Since the probability that the model is heteroscedastic is greater than 0.05 the study therefore accepts the null hypothesis and concludes that the model does not suffer from heteroscedasticity.

4.2.5 Autocorrelation Test Results

The Breusch-Godfrey Serial Correlation LM test was adopted in testing for autocorrelation between disturbance terms. The results of the test are summarized in table 4.5 below

Table 4.6: Breusch-Godfrey LM Autocorrelation Test Results

F-statistic	0.148117	Prob. F(2,26)	0.8631
Obs*R-squared	0.405551	Prob. Chi-Square(2)	0.8165

Consult Appendix 2E for full results

Since the probability value of the test exceeds 0.05, the study does not reject the null hypothesis and concludes that there's no serial autocorrelation within the model.

4.2.6 Model Specification Test Results

The study utilized the Ramsey RESET test in checking for specification errors. A correctly specified model will generate an adequate picture of the relationship between external debt and private investment. The results from the test are presented in Table 4.6.

Table 4.7: Ramsey RESET Test Results

F-statistic	Probability (p)	DW Statistic	R^2	Adjusted R^2
3.646378	0.0669	1.893741	0.805117	0.747374

Consult Appendix 2F for complete results

The probability value (0.0669) of the RESET test is higher than 0.05 implying that the study must not reject the null hypothesis and conclude that the model is probably correctly specified. Also, the DW statistic of 1.893 is greater than the R^2 value of 0.805 therefore implying that the model is free from spurious regression.

4.2.7 Normality Test Results

To check for normality in the distribution of the residuals, the study utilized the Jarque-Bera normality test. The test uses a histogram to assess normality by showing the disturbance mean and associated levels of kurtosis and skewness as shown by Table 4.7.

Table 4.8: Jarque-Bera Normality Test Results

Mean	Skewness	Kurtosis	Jarque-Bera Statistic	Probability	Standard Deviation
-1.48e-16	-0.626158	2.727119	2.464137	0.291689	2.951133

Consult Appendix 2G for full results

The Jarque-Bera statistic of 2.464 has a probability value of 0.29 which is higher than 0.05 thereby implying that the disturbance term is normally distributed. The disturbance term has a maximum kurtosis of 2.727 which is below 3 and is therefore acceptable. Rose et al (2015) posits that the maximum acceptable range of peakedness is 3. It is therefore safe to conclude that the disturbance term is normally distributed.

4.3 Presentation of Regression Results

The empirical model adopted in chapter 3 was estimated using OLS regression technique. The results of the relationship between external debt and private investment are presented in Table 4.8 together with the influences of other determinants of private investment.

Table 4.9: OLS Regression Results

Dependent Variable: PINV

Variable	Coefficient	Std. Error	t-statistic	Probability
C	2.4044376	4.058449	0.592437	0.5583
EXD	-0.081406	0.041346	-1.968914	0.0589
LAGEXD	-0.125441	0.037308	-3.362361	0.0023
PUBI	-0.022572	0.056807	-0.397352	0.6941
DEBTSERV	0.176938	0.084178	2.101944	0.0447
HFCE	0.133598	0.045714	2.922468	0.0068
TO	0.105415	0.050867	2.072347	0.0476
R	-0.022676	0.006019	-3.767336	0.0008

Consult Appendix 3 for full details

R^2	0.778798
Adjusted R^2	0.723497
F-statistic	14.08298
Prob (F-statistic)	0.000000
DW	1.848305

The estimated equation in table 4.8 above can therefore be summarized by equation 4.1 as;

$$PINV = 2.404 - 0.081EXD - 0.125LAGEXD - 0.023PUBI + 0.177DEBTSERV + 0.134HFCE + 0.105TO - 0.023R \quad\quad\quad \dots\dots\dots\dots \quad 4.1$$

In equation 4.1 PINV represents private investment, EXD is external debt, LAGEXD is external debt lagged by one period (representing the accumulation of external debt), PUBI is public investment, DEBTSERV is debt servicing, HFCE is household final consumption expenditure, TO is trade openness and R is real interest rate.

4.4 Interpretation of Results

The strength of the adopted regressors in modelling the relationship between public external debt and private investment is shown by the R^2 value of 0.7787 which is approximately 78%. This R^2 reflects the goodness of fit of the model. The value implies that approximately 78% of the variations in private investment is explained by the variations in the explanatory variables while the remaining 22% is captured by the stochastic error term (which captures influences of other variables not included in the model). Also the adjusted R^2 is above 0.5 implying that the model still has a good fit even after adjusting for more degrees of freedom. This implies that the model is a good fit in explaining yearly deviations in levels of private investment in Zimbabwe. Also the DW statistic of 1.84 is close to 2 implying that the mode does not suffer from spurious regression and thus valid for further analysis. The regression results in Table 4.9 however depict that current external debt (EXD) and public investment (PUBI) have insignificant influences on private investment.

4.4.1 Current External Debt (EXD)

Current debt flows were found to have an insignificant crowding out effect on private investment as evidenced by a p-value of 0.0589 which is greater than 0.05. This insignificant impact may imply that it takes time for external debt to significantly affect private investment.

4.4.2 Past External debt accumulation (LAGEXD)

External debt lagged was found to have the expected negative sign where a 1% increase in external debt accumulation would decrease private investment in Zimbabwe by 0.125%. This effect is statistically significant as evidenced by a p-value of 0.0023 which is below 0.05.This therefore implies that the accumulation of unpaid foreign debts discourages investment by restricting private access to foreign credit as foreign lenders become reluctant to release

further lending to private investors. For example, Zimbabwe cleared off its arrears owed to the IMF administered Poverty reduction and Growth Trust (PRGT) funds in 2016 after a decade long of interest accumulation, (IMF, 2017). Zimbabwe was consequently expelled from the PRGT initiative thus restricted from accessing the poverty and growth funds. Thus, simply put, accumulation of external debt stocks reduces private sector access to foreign finance thereby ultimately reducing private investment as shown by the negative coefficient of -0.125 in table 4.9. This therefore establishes the existence of a debt overhang in Zimbabwe. This is supported by Were (2001) who also found past external debt to deter investment in Kenya.

4.4.3 Debt servicing (DEBTSERV)

Prior to the estimation of the model, the study expected a negative relationship between debt servicing and private investment where debt servicing was expected to crowd out private investment. Regression analysis however produced a rather positive relationship where debt servicing was found to have a positive coefficient of 0.1769 which was statistically significant at 5% with a p-value of 0.0447. This therefore implies that when Zimbabwe manages to service-off old debts it can be able to access new financing cheaply from both old and new sources. The IMF (2017) does hold true to the fact that the ability of Zimbabwe to clear-off old arrears to the international community would promote and fast track its re-engagement process with international lenders. The IMF (2017) does take note that Zimbabwe is pressing ahead with its reengagement efforts with international finance institutions like the World Bank Group, IMF and AfDB thereby explaining the positive relationship between debt servicing and private investment in the economy. These findings are supported by Bayai and Nyangara (2013) who also found debt service to crowd-in private investment in Zimbabwe by 4.42%. They conclude that debt servicing provided positive incentives to foreign investors and lenders who had previously shunned way from investing in Zimbabwe.

4.4.4 Public Investment (PUBI)

Public investment was seen to crowd out private investment from the regression results in Table 4.9 although the effect was insignificance as evidenced by the p-value of 0.6941 which exceeds the 5% level of significance. Also the t-statistic is less than two thereby further emphasising the insignificance of the variable.

4.4.5 Household Final Consumption Expenditure (HFCE)

Household final consumption expenditure had an unexpected positive sign implying that private consumption would promote private investment in Zimbabwe. From the regression model a percentage increase in private consumption would stimulate investment by 0.134%. This positive but unexpected effect was statistically significantwith probability value of 0.0068. This would imply that an increase in household consumption would encourage investors to engage in more planned and unplanned investments. Although this is supported by the demand side Keynesian economics which posit that increase in consumption would have multiplier effect on economic growth by stimulating investment. Nonetheless, such high consumption has promoted foreign financing to compensate for the inadequate savings as a result of excessive consumption.

4.4.6 Trade Openness (TO)

Openness to trade was found to have a positive and expected sign implying that trade openness encourages private investment into the economy. From the regression model, a percentage increase in trade openness would drive investment by 0.11. These findings are in line with the findings of Kamundia *et al* (2015). Openness to trade promotes the free flow of imports and exports which encourage private investment especially exports are doing well. Free flow of raw material imports promote investment.

4.4.7 Real Lending Interest Rate (R)

The findings of real interest rate also referred to as real lending rate does conform to theory and satisfies the expected negative sign. According to the Keynesian theory of investment, high interest rates discourage investment. As such the model founds out that a unit increase in the real interest rate would cause investment to decline by 0.023% approximately. Bayai and Nyangara (2013) also found increases in the real lending rate to discourage private investment.

4.5 Conclusion

The estimated model found external debt both in terms of current debt flows and past debt flows to negatively affect investment in Zimbabwe although current debt inflows had an insignificant impact evidenced by its p-value of 0.0589. The accumulation of unpaid external public loans was seen to deter private investment by 0.125% as expected in Chapter 3. However, debt servicing was found to unexpectedly crowd-in private investment. This was

however attributed to the reengagement efforts by the Zimbabwean government where debt servicing is aimed at restoring the credibility status of Zimbabwe would open old and new financing alternatives to finance also private investment. The following chapter summarises the study at the same time offering policy recommendations basing on the findings.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

The aim of the empirical study was to analyse the nature of the relationship between external debt and private investment in Zimbabwe. Zimbabwe is currently perceived to be suffering from debt distress and as such the study aimed to address how such public indebtedness has affected capital formation in the private sector. This chapter will therefore offer concluding remarks on how external debt has affected investment via the accumulation of debt stocks and its subsequent servicing. With the use of the research findings in the previous chapter, this chapter will go on to offer policy recommendations and also recommend on areas for further research.

5.1 Summary of the Study

The main objective of this research was to establish the relationship between public external debt and private investment in Zimbabwe for the period 1980-2016. This was driven by the diverging growth of external debt indicators relative to private investment. Theoretical abstractions from the Two Gap model, Classical and Keynesian theories, Debt Overhang and Ricardian Equivalence were reviewed to provide a theoretical background of the relationship. The study therefore established the relationship between external debt and private investment by taking into consideration the two channels within which external debt affects investment; via current and past debt stocks (a feature of debt overhang). The inclusion of a lagged external debt variable allowed the researcher to capture the role of debt overhang on private investment which accrues from the accumulation of past debt stocks. Ordinary Least Squares regression technique was therefore used to estimate the adapted model. The results showed that out of the seven variables, only current external debt and public investment had insignificant impacts on private investment. The study therefore found debt overhang to negatively affect private investment since past debt stocks had a negative relationship with private investment. Debt servicing was however unexpectedly found to crowd-in private investment.

5.2 Conclusions

The concept of public indebtedness has gradually become a major topic of discussion in heavily indebted and distressed nations with a growing number of researchers trying to address its effects on domestic investment. This study in trying to estimate the nature of the relationship between external debt and private investment in Zimbabwe observed that current debt flows insignificantly affect private investment whilst the accumulation of past debt stocks leads to debt overhang which ultimately discourages private investment. This ultimately converges to that public external debt is an evil to private sector capital formation. The crowding-in role of debt servicing on private leads the researcher to not reject the null hypothesis that debt servicing does not crowd out private investment.

5.3 Policy Recommendations

The results of this study indicated that external debt does affect private investment significantly through past debt flows, a feature regarded as debt overhang. Clearly put, the inability of Zimbabwe to clear off its external debt obligations has consequently led to the development of a debt overhang which has therefore negatively affected the growth of private investment in the nation. This has therefore ultimately constrained the achievement of high growth rates in the country. This converges to the fact that Zimbabwe must develop sound debt utilization and management frameworks where debt is channelled towards productive investments where the returns on the foreign debt are enough to pay-off the debt and prevent further accumulation of unpaid foreign debts.

Zimbabwe has historically borrowed foreign funds for servicing of the high wage bill which is also argued to be inflated by the presence of ghost workers. This unproductive and inefficient utilization of these debts has also attributed to the accumulation of external debt stocks. Thus such debt utilization and management frameworks are essential if private investment is to be stimulated in the face of high debt distress. This will also reduce further accumulation of external debt stocks.

Zimbabwe has also suffered poor growth of private investment in the face of the high debt burden because of the lack of adequate privatization of industries. Privatization of say the railway industry together with other sectors and government parastatals will definitely promote private investment at the same time reducing public sector demand for foreign

credit. This will reduce the debt overhang effects on private investment and if very successful the country can even exit the debt overhang.

Considering that debt servicing was actually found to encourage private investment it therefore implies that if Zimbabwe manages to consistently service its debt, private investment will be crowded in. This therefore warrants the need for a quarterly debt servicing management framework where the RBZ undertakes a monthly analysis of debt servicing to ensure that debt service payments lie in the desirable range of the creditors. The IMF (2017), for example notes that the clearance of its PRGT loans by Zimbabwe will re-establish the nation as a benefactor of the scheme. Thus debt servicing will reengage Zimbabwe with International Financial Institutions. This will open new doors for further access to international credit. This will also boost both local and foreign investor confidence in the Zimbabwean economy.

5.4 Suggestion for future researches

Considering that Zimbabwe is currently suffering from debt distress, it is therefore disheartening that little has been researched on its impacts on private investment in the nation. The accumulation of external debt is argued to reduce the incentives for investment into the economy, as per the debt overhang theory. As such the field of external indebtedness offers an opportunity to clearly define the true role of foreign in stimulating investment and ultimately its consequences on economic growth in Zimbabwe.

The researcher also feels that the work done has not been too exhaustive in unveiling the nature and relationship between external debt and private investment mainly due to limited access to data. Other researches can also analyse the role of external debt on capital flight in Zimbabwe.

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APPENDICES

Appendix 1: Data Set

YEAR	PINV (% GDP)	EXD (% GDP)	PUBI (% GDP)	DEBTSERV (% GDP)	HFCE (% GDP)	TO	R (%)
1980	13.49	20.13	1.57	30.24	58.45	25.01	4.26
1981	16.47	15.47	6.42	21.97	61.33	22.57	12.75
1982	16.72	13.50	3.77	12.84	67.12	34.92	18.43
1983	16.53	10.25	8.39	35.33	62.69	37.45	37.53
1984	14.84	17.54	8.11	26.16	48.11	40.33	47.47
1985	11.36	12.66	6.12	29.04	53.46	41.69	41.19
1986	13.01	7.98	12.45	31.14	58.78	31.01	4.60
1987	14.02	5.37	14.68	32.29	58.95	28.49	5.42
1988	13.31	20.13	5.66	28.48	50.43	25.77	4.84
1989	11.37	25.70	-1.20	22.38	64.65	41.91	12.11
1990	15.93	22.68	-2.10	23.15	63.11	40.72	12.75
1991	18.29	21.75	7.17	23.12	65.88	50.10	23.90
1992	19.59	19.47	1.25	32.31	65.65	63.71	39.48
1993	20.84	22.89	7.88	30.11	68.88	63.17	41.70
1994	18.65	15.47	2.73	25.20	56.24	75.33	40.33
1995	21.88	30.91	2.85	31.56	59.31	68.14	30.76
1996	15.19	40.65	3.17	40.25	62.75	72.07	23.17
1997	15.67	35.47	7.55	16.58	70.17	65.11	36.48
1998	19.34	30.11	6.33	40.56	63.08	68.27	84.21
1999	10.73	42.57	4.58	20.15	69.39	65.41	43.87
2000	8.47	60.77	6.15	21.24	64.45	40.15	67.16
2001	2.09	60.39	1.25	18.54	25.72	40.72	38.20
2002	1.78	59.17	7.58	19.87	33.46	50.11	32.87
2003	0.21	60.73	6.36	34.51	46.48	75.95	75.44
2004	0.71	55.00	7.22	27.88	31.37	45.08	252.31
2005	0.84	47.51	4.44	35.12	25.31	61.01	219.28
2006	2.54	31.44	9.55	17.58	95.28	72.99	508.74
2007	3.76	70.65	69.95	30.94	76.06	65.17	572.94
2008	2.96	60.55	66.19	11.72	119.41	75.93	287.00
2009	10.84	67.11	20.10	20.43	100.71	65.11	150.00
2010	15.55	40.04	32.40	25.79	87.85	77.67	81.01
2011	12.90	67.40	3.66	8.11	92.07	63.49	65.58
2012	12.28	40.55	2.54	8.92	90.15	71.25	65.98
2013	8.55	67.84	6.94	5.43	85.77	66.21	55.23
2014	9.54	30.27	12.50	16.44	82.34	45.65	12.50
2015	9.22	8.15	4.23	5.29	76.98	38.69	10.20
2016	8.79	60.04	7.36	4.57	71.84	50.04	11.25

Sources: World Bank, IMF, Global Economy, Data market, ZIMSTAT

Appendix 2A: Stationary Tests

DEBTSERV UNIT ROOT TEST RESULTS

Null Hypothesis: DEBTSERV has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.171543	0.0009
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DEBTSERV)
Method: Least Squares
Date: 04/18/18   Time: 23:17
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBTSERV(-1)	-0.919339	0.177769	-5.171543	0.0000
C	29.53026	6.357112	4.645232	0.0001
@TREND("1980")	-0.446714	0.157111	-2.843309	0.0076

R-squared	0.449225	Mean dependent var	-0.713056
Adjusted R-squared	0.415844	S.D. dependent var	11.24214
S.E. of regression	8.592380	Akaike info criterion	7.219284
Sum squared resid	2436.357	Schwarz criterion	7.351244
Log likelihood	-126.9471	Hannan-Quinn criter.	7.265341
F-statistic	13.45776	Durbin-Watson stat	1.986006
Prob(F-statistic)	0.000053		

EXD UNIT ROOT TEST RESULTS

Null Hypothesis: D(EXD) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.920298	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXD,2)
Method: Least Squares
Date: 04/18/18   Time: 23:19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXD(-1))	-1.548137	0.173552	-8.920298	0.0000

R-squared	0.699655	Mean dependent var	1.615714
Adjusted R-squared	0.699655	S.D. dependent var	28.72807
S.E. of regression	15.74406	Akaike info criterion	8.378959
Sum squared resid	8427.765	Schwarz criterion	8.423397
Log likelihood	-145.6318	Hannan-Quinn criter.	8.394299
Durbin-Watson stat	2.036993		

HFCE UNIT ROOT TEST RESULTS

Null Hypothesis: D(HFCE) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.257874	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HFCE,2)
Method: Least Squares
Date: 04/18/18   Time: 23:21
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HFCE(-1))	-1.335434	0.161717	-8.257874	0.0000

R-squared	0.667273	Mean dependent var	-0.229143
Adjusted R-squared	0.667273	S.D. dependent var	29.01676
S.E. of regression	16.73758	Akaike info criterion	8.501346
Sum squared resid	9524.989	Schwarz criterion	8.545784
Log likelihood	-147.7736	Hannan-Quinn criter.	8.516686
Durbin-Watson stat	2.026448		

LAGEXD UNIT ROOT TEST RESULTS

Null Hypothesis: D(LAGEXD) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

	t-Statistic	Prob.*

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.826574	0.0000
Test critical values:	1% level	-2.634731	
	5% level	-1.951000	
	10% level	-1.610907	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LAGEXD,2)
Method: Least Squares
Date: 04/18/18   Time: 23:23
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAGEXD(-1))	-1.434496	0.162520	-8.826574	0.0000

R-squared	0.702339	Mean dependent var	-0.513529
Adjusted R-squared	0.702339	S.D. dependent var	26.20733
S.E. of regression	14.29827	Akaike info criterion	8.187124
Sum squared resid	6746.534	Schwarz criterion	8.232017
Log likelihood	-138.1811	Hannan-Quinn criter.	8.202434
Durbin-Watson stat	1.750133		

PINV UNIT ROOT TEST RESULTS

Null Hypothesis: D(PINV) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.885158	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PINV,2)
Method: Least Squares
Date: 04/18/18   Time: 23:24
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PINV(-1))	-0.997353	0.169469	-5.885158	0.0000

R-squared	0.504401	Mean dependent var	-0.097429
Adjusted R-squared	0.504401	S.D. dependent var	4.628777
S.E. of regression	3.258604	Akaike info criterion	5.228630
Sum squared resid	361.0290	Schwarz criterion	5.273069
Log likelihood	-90.50103	Hannan-Quinn criter.	5.243970
Durbin-Watson stat	2.003746		

PUBI UNIT ROOT TEST RESULTS

Null Hypothesis: PUBI has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.492703	0.0142
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PUBI)
Method: Least Squares
Date: 04/18/18   Time: 23:25
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PUBI(-1)	-0.303640	0.121812	-2.492703	0.0176

R-squared	0.150659	Mean dependent var	0.160833
Adjusted R-squared	0.150659	S.D. dependent var	14.58059
S.E. of regression	13.43743	Akaike info criterion	8.061349
Sum squared resid	6319.755	Schwarz criterion	8.105336
Log likelihood	-144.1043	Hannan-Quinn criter.	8.076702
Durbin-Watson stat	1.935329		

R UNIT ROOT TEST RESULTS

Null Hypothesis: D(R) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.914022	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(R,2)
Method: Least Squares
Date: 04/18/18   Time: 23:26
Sample (adjusted): 1982 2016

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(R(-1))	-0.830413	0.168988	-4.914022	0.0000

R-squared	0.415279	Mean dependent var	-0.212571
Adjusted R-squared	0.415279	S.D. dependent var	107.7192
S.E. of regression	82.36968	Akaike info criterion	11.68847
Sum squared resid	230682.0	Schwarz criterion	11.73291
Log likelihood	-203.5482	Hannan-Quinn criter.	11.70381
Durbin-Watson stat	1.956129		

TO UNIT ROOT TEST RESULTS

Null Hypothesis: D(TO) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.781079	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TO,2)
Method: Least Squares
Date: 04/18/18   Time: 23:27
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TO(-1))	-1.292763	0.166142	-7.781079	0.0000

R-squared	0.640236	Mean dependent var	0.394000
Adjusted R-squared	0.640236	S.D. dependent var	19.73080
S.E. of regression	11.83460	Akaike info criterion	7.808087
Sum squared resid	4761.962	Schwarz criterion	7.852526
Log likelihood	-135.6415	Hannan-Quinn criter.	7.823427
Durbin-Watson stat	1.985106		

Appendix 2B: Cointegration Test Results

Date: 05/22/18   Time: 01:04
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments
Trend assumption: Linear deterministic trend
Series: PINV EXD PUBI DEBTSERV HFCE TO R
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.826896	182.9607	125.6154	0.0000
At most 1 *	0.759074	121.5754	95.75366	0.0003
At most 2 *	0.543796	71.76117	69.81889	0.0347
At most 3	0.493093	44.29268	47.85613	0.1040
At most 4	0.319111	20.51272	29.79707	0.3887
At most 5	0.119433	7.060273	15.49471	0.5706
At most 6	0.071823	2.608662	3.841466	0.1063

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Appendix 2C: Multicollinearity Test Results

	EXD	LAGEXD	PUBI	DEBTSERV	HFCE	TO	R
EXD	1.000000	0.632874	0.349952	-0.281595	0.157903	0.477757	0.413828
LAGEXD	0.632874	1.000000	0.277703	-0.233860	0.205027	0.492299	0.347001
PUBI	0.349952	0.277703	1.000000	-0.012514	0.463507	0.275068	0.649320
DEBTSERV	-0.281595	-0.233860	-0.012514	1.000000	-0.485694	0.014127	0.047535
HFCE	0.157903	0.205027	0.463507	-0.485694	1.000000	0.403923	0.254383
TO	0.477757	0.492299	0.275068	0.014127	0.403923	1.000000	0.386226
R	0.413828	0.347001	0.649320	0.047535	0.254383	0.386226	1.000000

Appendix 2D: Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.414792	Prob. F(7,28)	0.8849
Obs*R-squared	3.382384	Prob. Chi-Square(7)	0.8475
Scaled explained SS	1.766958	Prob. Chi-Square(7)	0.9716

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/25/18   Time: 18:14
Sample: 1981 2016

Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.255534	14.77296	0.017297	0.9863
EXD	0.012397	0.150500	0.082374	0.9349
LAGEXD	0.012760	0.135801	0.093964	0.9258
PUBI	0.091146	0.206782	0.440782	0.6628
DEBTSERV	0.130316	0.306414	0.425295	0.6739
HFCE	-0.085834	0.166401	-0.515827	0.6100
TO	0.184565	0.185160	0.996788	0.3274
R	-0.011051	0.021910	-0.504361	0.6180

R-squared	0.093955	Mean dependent var	8.467265
Adjusted R-squared	-0.132556	S.D. dependent var	11.28552
S.E. of regression	12.01023	Akaike info criterion	8.002525
Sum squared resid	4038.877	Schwarz criterion	8.354418
Log likelihood	-136.0454	Hannan-Quinn criter.	8.125345
F-statistic	0.414792	Durbin-Watson stat	2.264686
Prob(F-statistic)	0.884889		

Appendix 2E: Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.148117	Prob. F(2,26)	0.8631
Obs*R-squared	0.405551	Prob. Chi-Square(2)	0.8165

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/18/18   Time: 23:37
Sample: 1981 2016
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.767706	4.420942	0.173652	0.8635
EXD	1.71E-05	0.044434	0.000385	0.9997
LAGEXD	0.002973	0.038942	0.076345	0.9397
PUBI	0.007897	0.062464	0.126432	0.9004
DEBTSERV	0.000315	0.087629	0.003594	0.9972
HFCE	-0.005989	0.049847	-0.120147	0.9053
TO	-0.012307	0.061839	-0.199022	0.8438
R	0.000811	0.006644	0.122037	0.9038
RESID(-1)	0.080611	0.249375	0.323250	0.7491
RESID(-2)	0.116279	0.238461	0.487624	0.6299

R-squared	0.011265	Mean dependent var	-1.48E-16
Adjusted R-squared	-0.330989	S.D. dependent var	2.951133
S.E. of regression	3.404678	Akaike info criterion	5.518311
Sum squared resid	301.3876	Schwarz criterion	5.958177
Log likelihood	-89.32960	Hannan-Quinn criter.	5.671836
F-statistic	0.032915	Durbin-Watson stat	1.906250
Prob(F-statistic)	0.999995		

Appendix 2F: Model Specification Test

Ramsey RESET Test
Equation: UNTITLED
Specification: PINV C EXD LAGEXD PUBI DEBTSERV HFCE TO R
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.909549	27	0.0669
F-statistic	3.646378	(1, 27)	0.0669
Likelihood ratio	4.560394	1	0.0327

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	36.26838	1	36.26838
Restricted SSR	304.8215	28	10.88648
Unrestricted SSR	268.5531	27	9.946413
Unrestricted SSR	268.5531	27	9.946413

LR test summary:

	Value	df
Restricted LogL	-89.53352	28
Unrestricted LogL	-87.25333	27

Unrestricted Test Equation:
Dependent Variable: PINV
Method: Least Squares
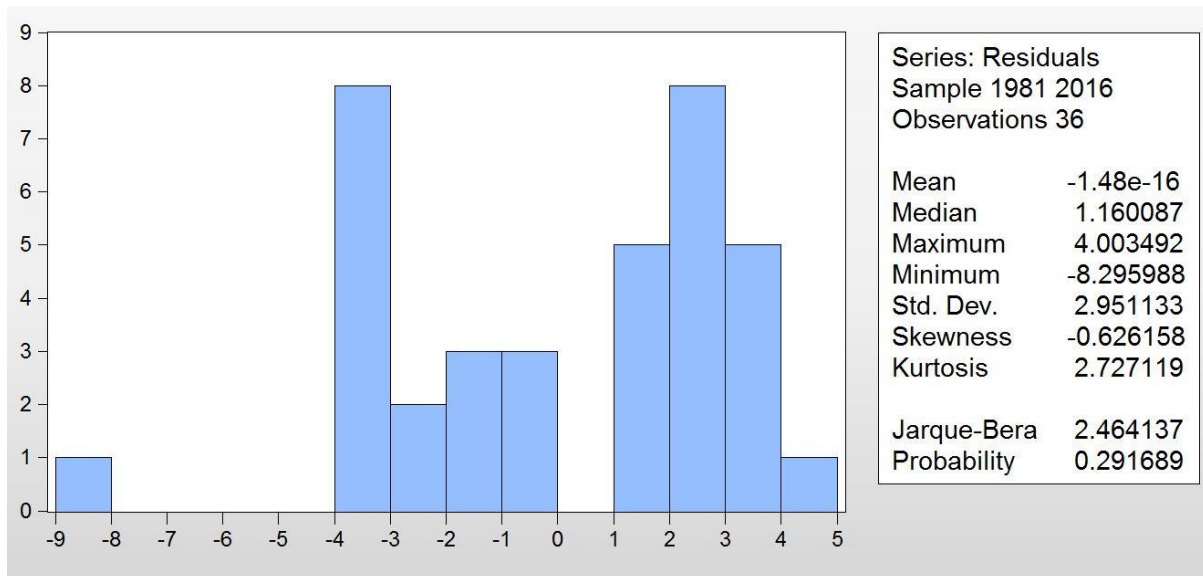Date: 04/18/18   Time: 23:39
Sample: 1981 2016
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.294230	3.922587	0.329943	0.7440
EXD	-0.003301	0.056876	-0.058030	0.9542
LAGEXD	-0.006875	0.071603	-0.096009	0.9242
PUBI	-0.018566	0.054340	-0.341663	0.7352
DEBTSERV	-0.010028	0.126731	-0.079127	0.9375
HFCE	0.060769	0.057999	1.047766	0.3040
TO	-0.001393	0.074112	-0.018795	0.9851
R	-0.005222	0.010801	-0.483448	0.6327
FITTED^2	0.046277	0.024235	1.909549	0.0669

R-squared	0.805117	Mean dependent var	11.52139
Adjusted R-squared	0.747374	S.D. dependent var	6.274713
S.E. of regression	3.153793	Akaike info criterion	5.347407
Sum squared resid	268.5531	Schwarz criterion	5.743287
Log likelihood	-87.25333	Hannan-Quinn criter.	5.485580
F-statistic	13.94306	Durbin-Watson stat	1.893741
Prob(F-statistic)	0.000000		

Appendix 2G: Normality Test Results

Series: Residuals	
Sample 1981 2016	
Observations 36	
Mean	-1.48e-16
Median	1.160087
Maximum	4.003492
Minimum	-8.295988
Std. Dev.	2.951133
Skewness	-0.626158
Kurtosis	2.727119
Jarque-Bera	2.464137
Probability	0.291689

Appendix 3: Regression Results

Dependent Variable: PINV
Method: Least Squares
Date: 04/18/18   Time: 17:02
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.404376	4.058449	0.592437	0.5583
EXD	-0.081406	0.041346	-1.968914	0.0589
LAGEXD	-0.125441	0.037308	-3.362361	0.0023
PUBI	-0.022572	0.056807	-0.397352	0.6941
DEBTSERV	0.176938	0.084178	2.101944	0.0447
HFCE	0.133598	0.045714	2.922468	0.0068
TO	0.105415	0.050867	2.072347	0.0476
R	-0.022676	0.006019	-3.767336	0.0008

R-squared	0.778798	Mean dependent var	11.52139
Adjusted R-squared	0.723497	S.D. dependent var	6.274713
S.E. of regression	3.299467	Akaike info criterion	5.418529
Sum squared resid	304.8215	Schwarz criterion	5.770422
Log likelihood	-89.53352	Hannan-Quinn criter.	5.541349
F-statistic	14.08298	Durbin-Watson stat	1.848305
Prob(F-statistic)	0.000000		

Appendix 4: Summary Statistics

	PINV	EXD	LAGEXD	PUBI	DEBTSERV	HFCE	TO	R
Mean	11.57459	35.63000	34.95194	10.15676	23.38486	65.77505	53.14595	82.99838
Median	12.90000	30.91000	30.59000	6.360000	23.15000	64.45000	50.11000	39.48000
Maximum	21.88000	70.65000	70.65000	69.95000	40.56000	119.4100	77.67000	572.9400
Minimum	0.210000	5.370000	5.370000	-2.100000	4.570000	25.31000	22.57000	4.260000
Std. Dev.	6.195409	20.57679	20.44515	15.28096	9.715910	20.14227	16.83994	129.5064
Skewness	-0.414670	0.284159	0.349702	3.103342	-0.316445	0.192650	-0.191758	2.660341
Kurtosis	2.159610	1.690801	1.766256	12.02840	2.322954	3.457611	1.710988	9.518198
Jarque-Bera	2.149175	3.140353	3.016936	185.0539	1.324202	0.551708	2.788312	109.1447
Probability	0.341439	0.208008	0.221249	0.000000	0.515767	0.758924	0.248042	0.000000
Sum	428.2600	1318.310	1258.270	375.8000	865.2400	2433.677	1966.400	3070.940
Sum Sq. Dev.	1381.791	15242.55	14630.15	8406.279	3398.360	14605.59	10209.00	603789.0
Observations	37	37	36	37	37	37	37	37