MIDLANDS STATE UNIVERSITY

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

Causal Relationship between Financial Development and Economic Growth in Southern Africa: A Static and Dynamic Panel Data Approach (2006-2015)

A Dissertation Submitted By

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF COMMERCE HONOURS DEGREE IN ECONOMICS AT MIDLANDS STATE UNIVERSITY

November-2017

GWERU, ZIMBABWE

SUPERVISOR'S APPROVAL FORM

I, the undersigned do admit that *Bandura Witness Nyasha* has consulted me for assistance and guidance on his research dissertation entitled, "**Causal relationship between Financial Development and Economic Growth in Southern Africa: A Static and Dynamic Panel Data Approach (2006-2015)**," until completion. This was in partial fulfilment of the Bachelor of Commerce Economics Honours Degree at the Midlands State University. I therefore do advise the student to submit his work for final assessment.

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The undersigned certify that they have supervised and recommend to the Midlands State University for acceptance a research dissertation entitled: **Causal relationship between Financial Development and Economic Growth in Southern Africa: A Static and Dynamic Panel Data Approach (2006-2015)** submitted by **Bandura Witness Nyasha** in partial fulfilment of the requirements of the Bachelor of Commerce Economics Honours Degree.

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DECLARATION

I, *Bandura Witness Nyasha* proclaim that this research is my personal work and I confirm that it has not been submitted to any institution in fulfilment of any qualification.

Student.. Date………………………………

DISCLAIMER

The views or strong statements in this research by any way do not represent university's views or the research supervisor and in any way are not meant to insult any individual, institution or establishment but instead are predestined only for intellectual purposes

DEDICATION

I dedicate this work to my family and friends, for without them I would not have reached this far. For they gave me a shoulder to lean on through thick and thin, all the love and support they have expressed to me and making sure that I am an empowered person.

ACKNOWLEDGEMENTS

Allow me to express my heartfelt gratitude and honour to the Almighty Lord for allowing successful progress in carrying out this study. My sincere gratitude also goes to my academic supervisor, Mr. C. Dzingirai for his attentiveness, intellectual support and guidance in this research. He has made a huge difference in my capacity for research and I am thankful about that. Equal thanks also go to MSU Economics Department staff for the complementary assistance. Much respect also goes to my loyal family for their undivided support and strong faith in my capabilities. They will always be my source of inspiration. Special thanks goes to Kennedy Bandura, Elizabeth Matimati, Listen Bandura andJoel Matimati for their steadfast kindness over the yearsof study.

ABSTRACT

The study seeks to investigate the causal linkage between financial development and economic growth of 14 Southern African countries over the period 2006-2015. The study utilises static and dynamic panel regression models with private sector credit ratio and broad money ratio as financial development indicators. Mixed findings are found in this study depending on the method used. There is, however, convincing evidence of causality running from financial development to economic growth which is in-line with supply-leading hypothesis by Patrick (1966). Varying result are obtained for demand-leading hypothesis from one model to another. Financial development through facilitating the allocation of credit to the most productive private sectors as well as effective managing of its monetary policies are recommended.

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LIST OF ABBREVIATION / ACRONYMS

GDP…………..…………………….…….Real Gross Domestic Product

GMM……………………......................Generalised Method of Moments

IMF……………………………………….International Monetary Fund

LLSV……………………………………. La Porta, Lopez-de-Silanes, Shleifer, and Vishny

M&M……………………………………..Modigliani and Miller

PRIVY…………………………………… Claims on Private Sector over GDP

US………………………………………...United States

VIF……………………..……………...Vector Inflation Factor

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The causal relationship that exist between economic growth and financial development in Southern Africa over the period 2008 to 2015 is to be investigated in this study. The indicators of financial development included in the study are the domestic credit to the private sector over GDP and broad money over GDP. The financial sector comprise of stock markets, banks, pension funds and insurance companies (Mishkin, 2007). The focus is narrowed only to the bank-based financial development in this study since there is lack of reliable data on market-based for most Africa countries.

The financial system is well known for its critical role in promoting the allocation of capital to the highest return use, alter the composition of savings, fostering specialisation and market formation as well as enhancing economic growth after it occurs (Greenwood and Smith, 1997). King and Levine (1993) supported the crucial contribution that comes with financial development. As highlighted by Aghion *et al* (2010), the financial system can free liquidity challenges on firms and increases the capacity for long-term investment, which consequently reduces the volatilities of economic growth. Schumpeter (1942) supported the view that entrepreneurs earn profit by inventing better goods and financiers arise to screen entrepreneurs. The cost of external finance to firms is also reduced by financial development (Rajan and Zingales, 1996). In countries with well-developed financial system, literature has also shown that risks which comes with exchange rates volatilities are also minimized (Aghion *et al*, 2009).

1.2 Background of the Study

African economies have been experiencing economic hardships in the midst of external shocks over the period under review. These shocks include continuous decline in commodity prices, deterioration of local exchange rates against the US Dollar and the recent global financial crises which intensifies in 2008. The continent has been characterised with tighter monetary position. The private sector liquidity was also aggravated by the resorting of the domestic financing by the public sector (International Monetary Fund (IMF), 2016). It is also shown that larger fiscal deficits and tighter monetary policies increased borrowing costs for the private sector. In the process, most of the Sub-Saharan Africa countries experienced a decline and even contraction in the growth of credit to the private sector as shown in Figure 1.1, with the latest year being 2015.

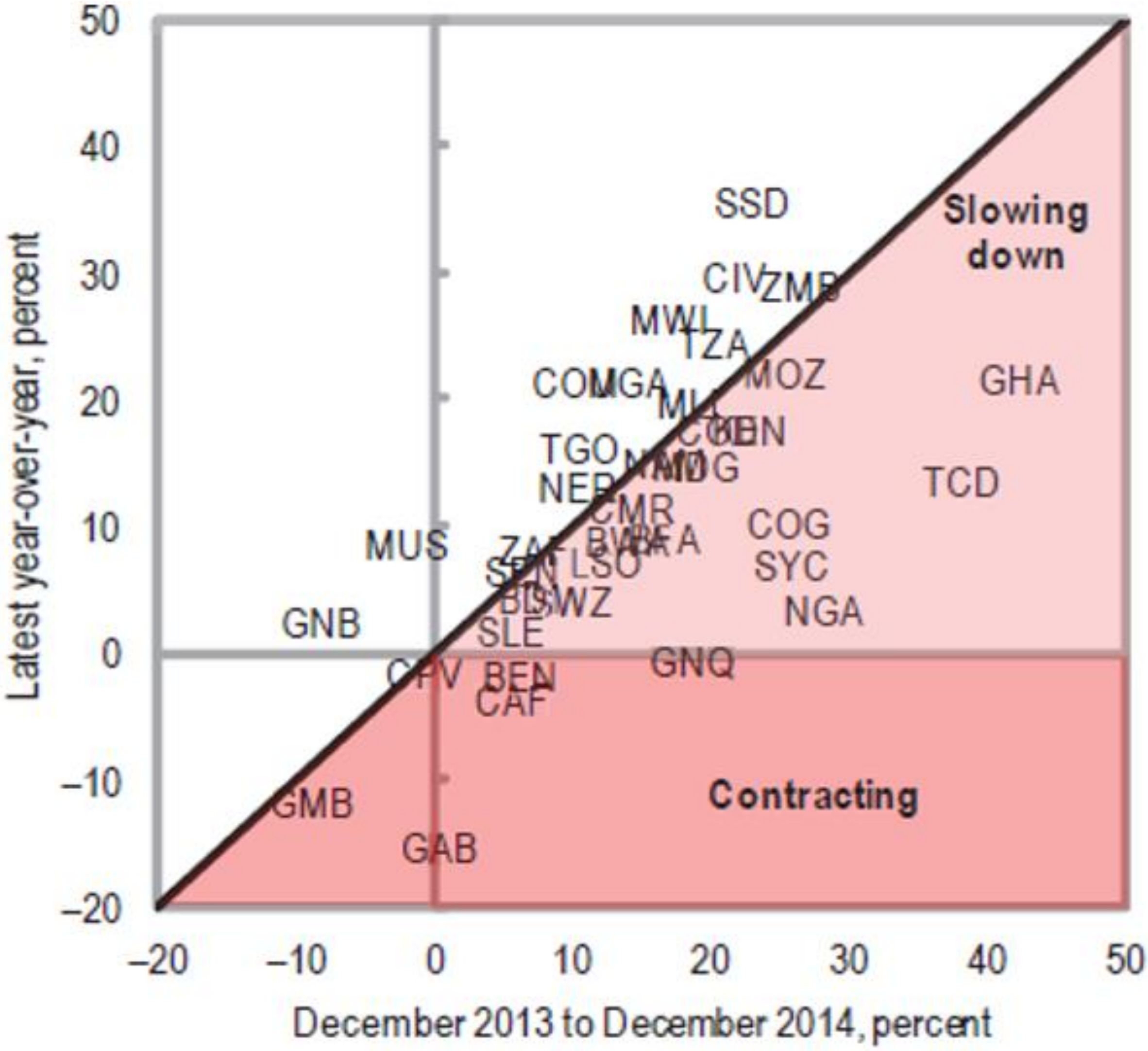

Figure 1.1: Sub-Saharan Africa: Growth of Credit to the Private Sector
Source: IMF (2016)

Note: See Appendix 2 for country abbreviations.

As shown by Figure 1.1, most of the countries in Sub-Saharan Africa region are experiencing a decline and contraction in growth of credit to the private sector. The sample of the countries involved includes a considerable part of the region under study (Southern Africa).

The exchange rate pressure was triggered by the intensive external shocks and there has been varying monetary response across the region. This has led to a deterioration in terms of trade and the situation was also worsened by a fall in net capital inflows as reported by IMF (2016). In most countries in the region which includes Lesotho, South Africa and Zambia experienced increasing inflation rates following the impact of drought on food supply (IMF, 2016). In a bid to curb these pressures, the monetary contraction policies where implemented by the authorities through reduction in monetary aggregates and increase in interest rates. Figure 1.2 shows the monetary aggregates for the selected Sub-Saharan Africa countries.

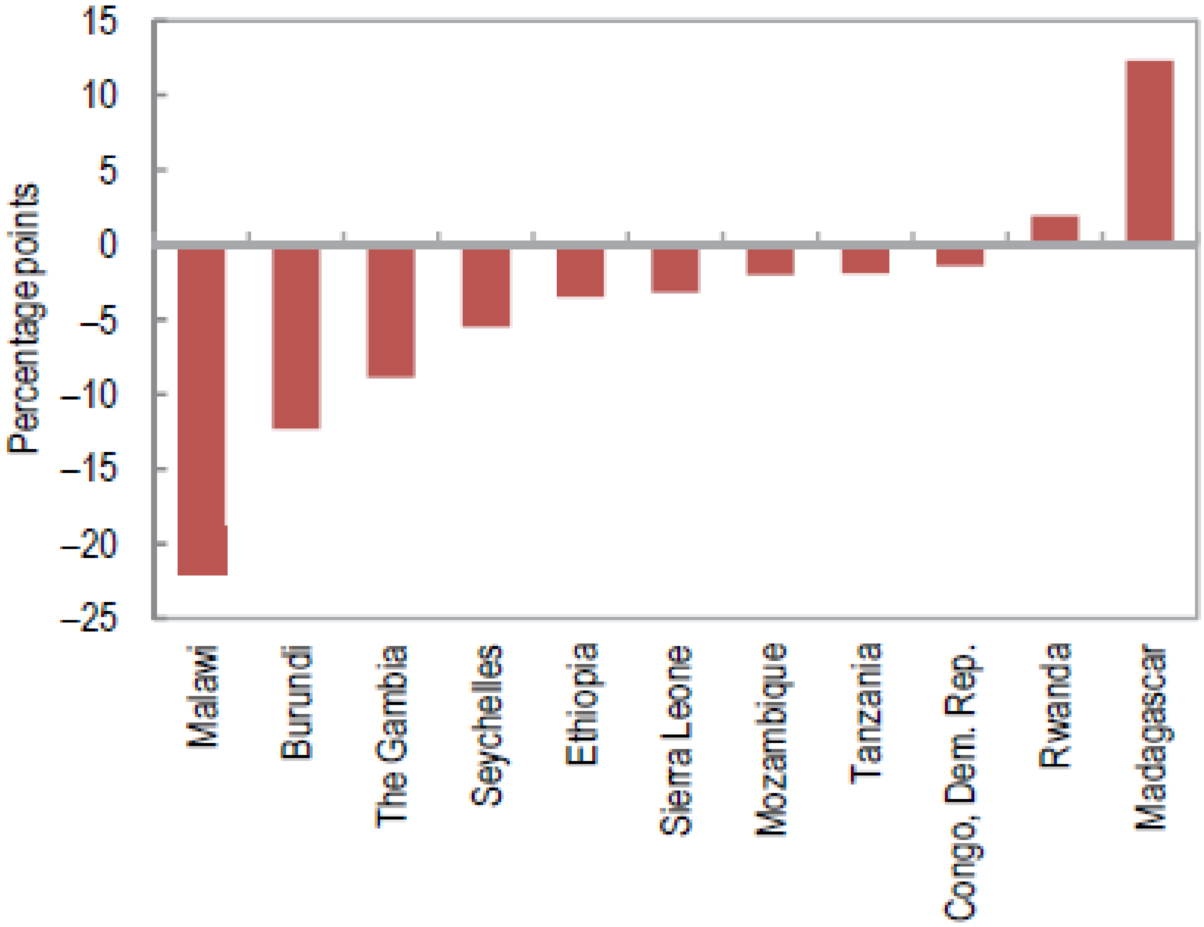

Figure 1.2: Sub-Saharan Africa: Change in Monetary Base Growth Rate (2014-2015)
Source: IMF (2016)

Figure 1.2 shows that many countries reduced their monetary base during the period 2014 to 2015 with the exception of Madagascar. IMF (2016) also shows that many countries in Southern Africa which includes South Africa, Zambia and Angola drastically increased their Monetary Policy Rate since December 2014.

The volatility on the exchange rates against the US Dollar has caused problems in facilitating profitable international trade. This is supported by Aghion *et al* (2009) who stated that well developed financial markets and institutions helps in reducing the negative impact that exchange rate volatility has on firm liquidity and thus investment capacity. This has worsened the current account balances of many African countries as shown on the Figure 1.3.

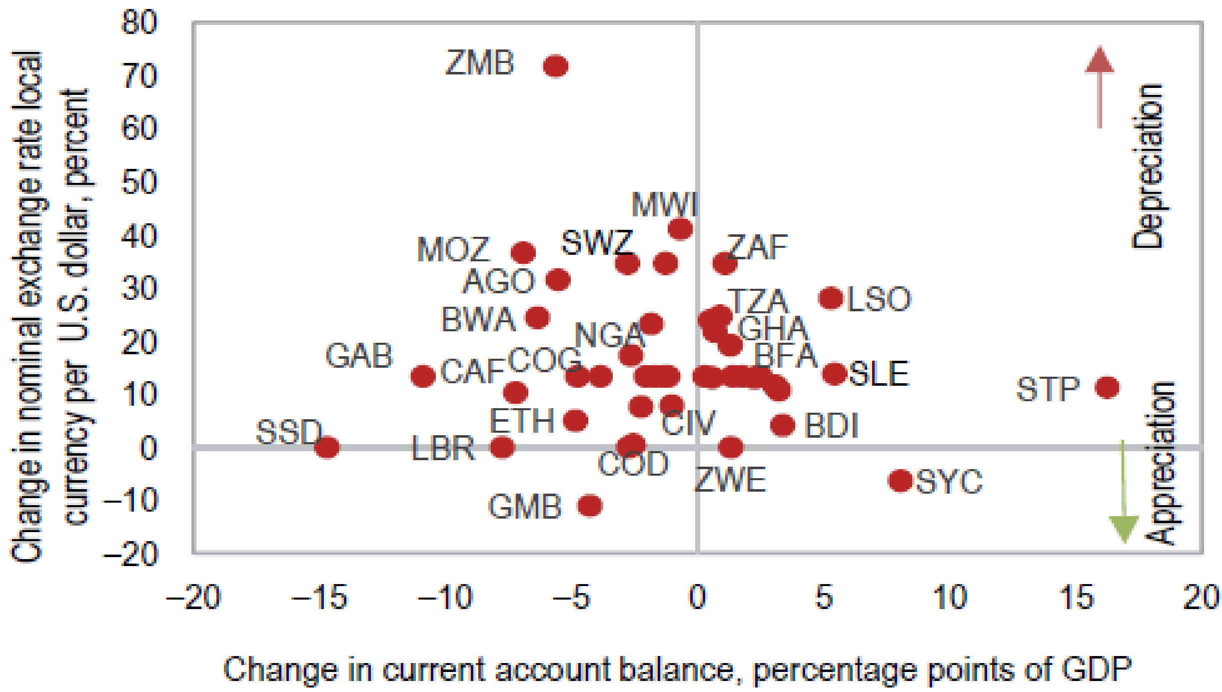

Figure 1.3: Exchange Rates per US Dollar the Current Account Balance (2009-2015)
Source: IMF (2016)

Note: See Appendix 2 for country abbreviations.

Figure 1.3 shows that most of the countries in the sample are crowded on the left-top box of the figure which is characterized by depreciating local currency against the US Dollar and negative change in current account balance. It can be clearly seen that the African countries' currencies depreciated which left the region with unfavorable terms-of-trade. This resulted in the worsening current account balances given that the most exported commodities where exported at low prices.

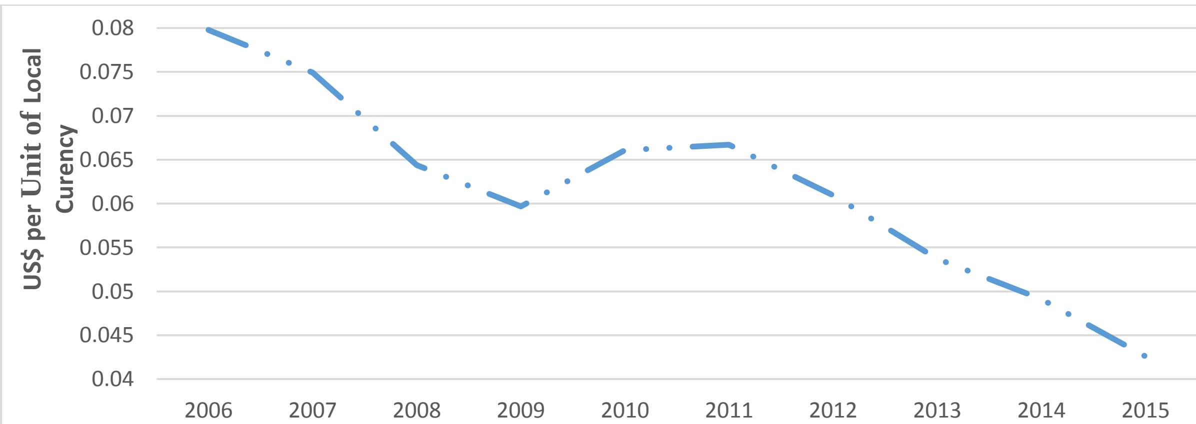

Figure 1.4: Average US Dollar Exchange Rate against the Southern African Currencies (2009-2015)
Source: Researchers' computations based on IMF Database (2017)

Figure 1.4 also indicate a falling trends of US Dollar exchange rate against the average Southern Africa's local currency for the period 2009-2015. The trend represents declining value of US dollar for each average Southern African currencies. The substantial depreciation of the currencies exposed the continent to high risk of external shocks, more particularly, in as much as trade and dollar denominated debt servicing is concerned. This is exacerbated by over dependence of African countries on external borrowing such as from Bretton Woods Institutions has raised concerns given the accumulation of unsustainable debt levels. With Rajan and Zingales (1996) view that financial development facilitates economic growth by reducing the costs of external finance to firms and consequently leading to growth will minimise debt worries in the region. Given that the African economies are much dependent on international commodities, the subsequent fell in its prices has left the continent with high risk of external shocks. The continuous decline started from 2011. There was a corresponding decline in the growth rates in the Southern Africa countries as shown in Figure 1.5.

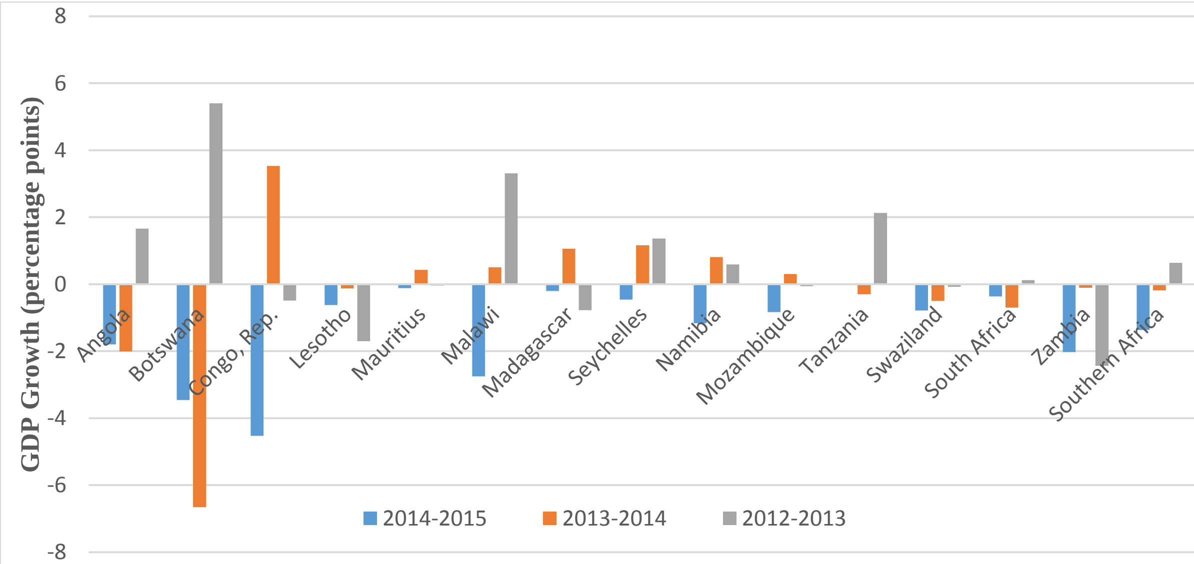

Figure 1.5: Percentage points of Real GDP Growth Rates for Southern Africa countries
Source: Researchers' computations based on IMF Database (2017)

As shown in Figure 1.5, all countries as well as the average for Southern Africa exhibit a decline in growth rates from the year 2014 to 2015. Most of the countries in the region also experienced a decline in growth from the period 2013 to 2014 with a negative average of the considered countries. The period 2012 to 2013, however, shows a slightly positive change in growth rates. The average Southern Africa's growth rate for the period 2006-2015 is as shown in Figure 1.6.

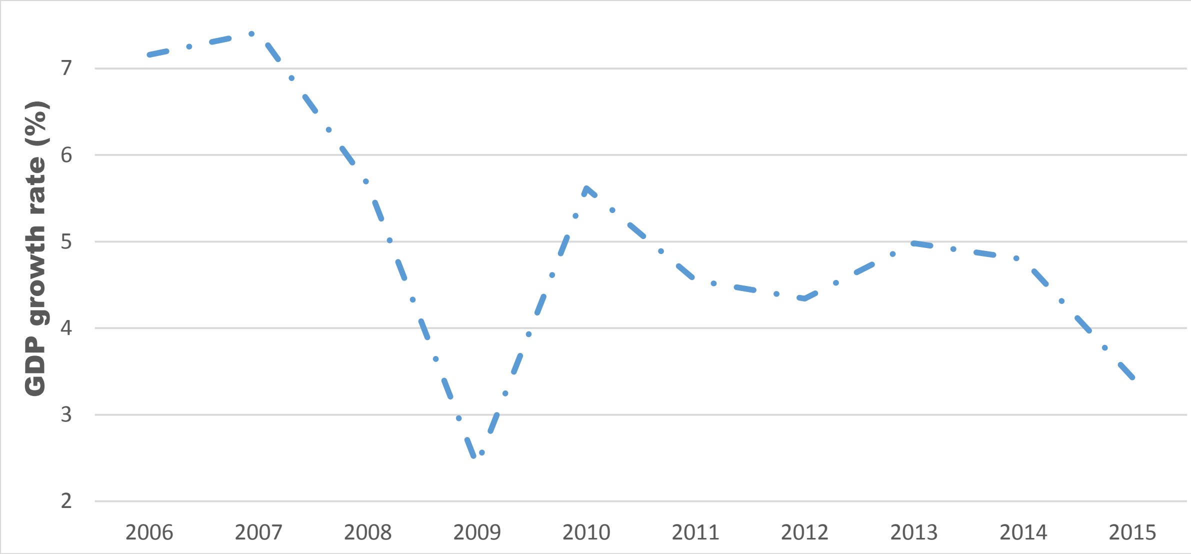

Figure 1.6: Average Real GDP Growth Rates for Southern Africa countries
Source: Researchers' computations based on IMF Database (2017)

The continued falling growth rates shown on Figure 1.6 have raised worries over the outlook of the Southern Africa region. The volatile in growth rates can be attributed to some macro-economic factors such as credit to the private sector challenges and terms-of-trade deterioration which called for monetary policy intervention.

1.3 Problem Statement

The Southern Africa region has been highly affected by the appreciation of the US Dollar which caused difficulties in terms-of-trade and a resultant current accounts deterioration. This, worsened by low capital inflows in the region have seen consequent decline in the claims to the private sector. Monetary authorities reduced monetary aggregates to solve the challenge by improving terms of trade through increasing the value of local currencies. Episodes of destructive financial crises with the recent one in 2008 and the continuous decline in commodity prices since 2011 also speed up the economic misfortune. As such, volatilities in growth rates have been witnessed during the same period. Literature has, however, shown that strong financial system are less prone to negative effects of shocks. It is also possible that economic growth might have a feedback impact on financial development and hence the need for to determine the causal linkage in the region. The decline of private credit ratio and broad money ratio at the back of a declining economic growth is the major problem in this study.In this regard, this study seeks to investigate the nexus between financial development and economic growth.

1.4 Research Objectives

The main objective of the study is to determine the causal relationship between financial development and economic growth in Southern Africa. The study will pay particular attention on identifying the following specific objectives;

- ✓ To analyse the causality link between monetary policy adjustments through money supply and economic growth.
- ✓ To analyse the causality link between credit allocation to the private sector and economic growth.
- ✓ To identify if financial development is relevant in the Southern Africa.

1.5 Significance of the Study

Given that the region has been hardly affected by the external shocks, the study, therefore, determine the effectiveness of financial system in improving its economic growth or vice-versa. Authorities have been putting efforts aimed at achieving favourable terms-of-trade as well as ensuring productive distribution of credit. It is, therefore, worthwhile to assess the impact of monetary policy through manipulation of money supply in an environment exposed to external shocks such as global financial crises, exchange rates deterioration and commodity price decline. The analysis on the significance of credit to the private sector is also going to be established.

As highlighted by Aghion *et al* (2010) that the financial system can minimise the liquidity constraints of firms and facilitating the much sort for long-term investment, which consequently reduce the volatility of investment and growth. The negative impact that the exchange rate volatility has on firm's liquidity can also be reduced by well-developed financial institution (Aghion *et al*, 2009). This is much important in economies that heavily depend on natural resources which exposes them to high terms of trade and real exchange rate fluctuations. Southern African countries are particularly victims of contagion effects which comes with global financial crises.

The financial crises of 2008 caused economic hardship from the developed economies to the developing economies. African countries were highly affected through contagion effects through trade, exchange rate volatility and debt servicing, among others. Cihak *et al* (2012) showed that the countries in Africa are more susceptible to shocks given their weak financial system. Since this region is associated with many developing economies, there is strong need to effectively take into consideration the analysis in a more homogeneous region to maintain high financial development which is more resistant to shocks. This study, however, empirically identify the impact of selected financial development variables to growth for policy guidance.

This study, however, analyses the significance of the changes in momentary policy and the distribution ofcredit between the private and public sector in the Southern Africa region. Utilisation of the static and dynamic models is also done in this study on Southern Africa region. The study will guide the central banks and the ministries of finance to determine the effective monetary policy in the region as well as to put in place measures which ensures the effective allocation of credit between the private sector and the government.

1.6 Research Hypothesis

The hypothesis to be tested are:

H_0: There is no causal relationship between financial development and economic growth in Southern Africa.

1.7 Study Limitations

There is no readily available data to also consider the significance of market-based financial system. Data for stock markets developments for African countries was not found on IMF and World Bank database. The study also fail to come up with the necessary data for Zimbabwe from World Bank and IMF databases which are reputable data sources.This has forced the abandonment of the country from the sample of Southern Africa countries.

1.8 Study Delimitations

The study emphasised on bank-based financial system, leaving behind the insignificant market-based development in the region. The market-based system cannot explain much growth in the area of study. This has been supported by Marone (2003) who found that stock markets are not critical to developing economies which comprises the greater part of our sample.

1.9 Organisation of the Study

The research consists of five chapters. With the just ended first chapter, the other chapters are in the following order: The Chapter Two is focused on theoretical framework and empirical literature review. Chapter Three outlines the methodology of the research, model specification, justification of the variables and tests to be presented in Chapter Four. Chapter Four presents the findings, their analyses and interpretations. Lastly, the study's summary, recommendations and conclusions from the analysis are presented in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this section, the researcher analyses and makes a detailed review of literature available concerning the causal link between financial development and economic growth. The chapter includes both empirical and theoretical evidence.

2.2 Theoretical Literature Review

Arrow and Debreu (1954) determines the extent to which competitive markets could lead to an efficient allocation of resources despite the existence of the financial system. Their contribution was on general equilibrium theory which explains the existence of general economic equilibrium. The theory implies that there is no causal relationship between financial development and economic growth from any direction.

Given the cases of incomplete markets, Modigliani-Miller (M&M) (1958, 1961 and 1963) theorem holds. The firms are incentivised to trade the securities available. The theory shows that the share prices and dividends are fully interdependent whilst is mutually independence between the market value of a firm and capital structure. M&M shows that the debt equity ratio has no effect on the market value of the firm. The theory, therefore, showed how important financial development is to economic growth through facilitating the trading of security. This implies causality relationship between financial development and economic growth as transfer of credit to its highest return use is deemed necessary in an incomplete market.

It has been noted that diversification is facilitated which in turn increases the technological change which leads to economic growth (King and Levine, 1993). This shows how financial development is vital in as much as economic growth is concerned. As such, a causality link can be drawn running from financial development to economic growth. The importance of innovations and credit is also critical in the theory of economic development developed by Schumpeter (1982). The financial means for investment activities to the innovative entrepreneurs is given in the form of credit which is considered a prerequisite for innovation and new enterprise in the theory. The idea of Schumpeter can be paraphrased by financial system's decision of who can use the savings which has a say in resource allocation, productivity improvement which leads to long run economic growth.

The crucial role that credit or money supply plays for development purposes is supported by the monetarist's view (Mishkin, 2007). The prospective investors will be given access to the much needed financial resources for the achievement of their critical aims and objectives. The theory shows that the positive benefits of liquidity is, however, expected to be effective when the economy is operating below full capacity since beyond this money supply may be inflationary.

The significant part played by the legal institutions in explaining the significant international differences in development is analysed in the law of finance theory (La Porta *et al*, 1997, 1998, 2000). It's acknowledged that more savings are likely to be raised where the legal systems enforce private property rights, support private contractual arrangement and protect the legal right of investors. This then implies unidirectional causation from financial development from a wider base of savings to finance economic growth. Besides, the legal theories emphasize mechanisms through which legal origin influences finance. It is also stated in Beck *et al* (2001) the priority attached to property rights and protections will reflect the differences in legal traditions. As such, there is a link between financial development and economic growth.

Patrick (1966), however, suggested contrasting possible channels linking financial development to economic growth. The theory came up with supply-leading and demand-following hypothesis with respect to stages of development. The supply-leading hypothesis states that economic growth is a function of financial development whilst the demand-following hypothesis confirms economic growth will spark the demand for financial services. The demand following hypothesis can also be called the growth-led finance hypothesis where by economic growth would trigger the development in the financial sector. The theory, therefore, implies possibility of bilateral association of growth and financial services provision.

It has been explained by Romer and Chow (1996) that the Solow Growth Model predicted that low savings and increasing population growth rates leads to low investment and economic growth levels which translates into lower standards of living. The relationship between accumulation of capital, the savings activity and the current production gives a reason for tendency of different nations to approach an equilibrium which is known as the steady state level of the capital stock. As such, financial sector development through sacrificing today's consumption for capital investment through high savings in financial system will lead to economic growth. This then support the financial development to economic growth causal relationship.

2.1 Empirical Literature

There is much empirical literature on the study area and to start with the studies which pay particular attention on granger causality is African countries only, we have a study by Odo *et al* (2016). The study analysed the causal relationship between economic growth and financial development in South Africa and Nigeria by employing cointegration test, Vector Error Correction Model (VECM) and Granger causality test using annual time series data for the period 1980-2014. The study analyses the applicability of financial development by Hugh Patrick (1966) in both countries. The result of granger causality indicates a unidirectional causality running from financial development to economic growth in Nigeria and a bidirectional causality between the financial development and economic growth in South Africa. Johansen multivariate cointegration test shows a long run relationship between the ratio of broad money supply to GDP, ratio of domestic credit to private sector to GDP, real interest rate and economic growth. The VECM result shows that the ratio of broad money supply to GDP has no significant impact on economic growth in Nigeria and South Africa but the ratio of domestic credit to private sector to GDP has significant impact on economic growth in both countries. In this study there is, however, also the utilisation of causality test in GMM context which is the dynamic model.

Besides, Akinlo and Egbetunde (2010) in a sample of 10 Sub-Saharan African countries also examined the long-run as well as the causal relationship between financial development and economic growth. Their study uses VECM on which they found a long-run relationship from cointegration, over the period 1980 to 2005. The results also shows that financial development granger cause economic growth in Central African Republic, Congo Republic, Gabon, and Nigeria while economic growth granger cause financial development in Zambia. The bilateral relationship was also found in Kenya, Chad, South Africa, Sierra Leone and

Swaziland. The broad money ratio and private credit ratios are the financial development indicators used in the study. In this the panel regressions are, however, utilised to give aggregated and conclusions from the whole region of Southern Africa and there is the implementation of both the static and dynamic techniques.

On the studies which included countries beyond Africa, financial development explain subsequent growth according to Rousseau and Wachtel (2000). The study used panel VARs with annual data for the period 1980 to 1995 for 47 countries with the main aim of assessing the relationship that exist on financial development and economic growth. The study made use of M3/GDP to measure bank development and market capitalization ratio, the value of trades relative to GDP, and the value of trades relative to market capitalization. This study, however, considers a more homogeneous regional sample of countries in Southern Africa.

Again, a study on a sample of 47 countries over the period 1976 to 1993 by Levine and Zervos (1998) found a positive impact from the market-based and bank-based financial development. The indicator for financial development used are bank credit to the private sector ratio, the market capitalization ratio, the values of trades relative to GDP and the value of trade relative to market capitalization. The ordinary least squares method was utilised. Focus in this research is brought to homogeneous region of Southern Africa for effective policy advice.

Arestis *et al* (2000) studied five developed economies and shows that while both banking sector and stock markets development explains subsequent growth, the impact of banking sector developments is more pronounced. A vector error correction method (VECM) was utilised in the study. The period under review was for Germany during 1973Q1 to 1997Q4, the United States for 1972Q2 to 1998Q1, Japan for 1974Q2 to 1998Q1, the United Kingdom for 1968Q2 to 1997Q4, and France for 1974Q1 to 1998Q1. This study, however, is more concerned with developing and selected emerging economies.

On the literature which considers dynamic techniques we have Beck and Levine (2002). They empirically analyses the effect of financial development on growth, drawing from a sample of 40 countries for the period 1976 to 1998 applying the advanced Generalised Least Squares (GMM) techniques for dynamic panels. They found that financial development positively influence economic growth. This study, however, considers developments within the recent period of 2006 to 2015.

The GMM technique was also utilised to determine the influence of the financial development indicators for the period 2000 to 2011 by Wait and Ruzive (2016). A positive impact was found from the private credit ratio and the broad money supply ratio on growth in BRICS and non-BRICS emerging countries. This research is, however, focused on Southern Africa since the regions are believed to exhibit different characteristics.

Conclusively, there are mixed results obtained from both the static and dynamic methods showing that there is a possibility of bilateral causality depending on the technique used, study period and the area on interest. This study, however, analysed the significance of the momentary policy interventions and the gradual decline in credit to the private sector in the Southern Africa region. The region was exposed to external shocks at the background of dynamics in the financial development indicators. The financial development dynamics are going to be analysed over the period inclusive of the most recent external shocks which comes with the global financial crises (2006-2015).

2.2 Conclusion

This chapter highlights applicable literature to various approaches on the association of financial development and economic growth. The theoretical review focused mainly on what theory explain concerning the financial development and economic growth. Empirical literature indicated that few studies have been carried out in this area within the recent period (2006-2015). Methodology, the justification of variables and data sources are analysed in the next chapter of this study.

CHAPTR THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this section the research methodology and analytical tools employed are highlighted. This chapter, therefore, presents the model used in research, justification of variables, data sources and its characteristics.

3.1 Model Specification

The static models used are adapted from Sekkat and Varoudakis (1998) in their study on manufactured exports and exchange rate management in takes the form;

$GDP_{it} = \alpha + \sum_{j=1}^{J} \beta_j x_{it}^{j} + \sum_{m=1}^{M} \beta_m x_{it}^{m} + \varepsilon_{it}$……………………………………………..………………...….(1a)

$DC_{it} = \alpha + \sum_{j=1}^{J} \beta_j x_{it}^{j} + \sum_{m=1}^{M} \beta_m x_{it}^{m} + \varepsilon_{it}$…………………………………………….…………………….(1b)

$MS_{it} = \alpha + \sum_{j=1}^{J} \beta_j x_{it}^{j} + \sum_{m=1}^{M} \beta_m x_{it}^{m} + \varepsilon_{it}$…………………………………………….…………………….(1c)

Where, $GDP_{it}$is the economic growth measure, which is Gross Domestic Product growth rate,$DC_{it}$is the private sector credit as a ratio of GDP, $MS_{it}$is the broad money as a ratio of GDP,

$x_{it}^{j}$is the vector of financial development variable that impact economic growth,

$x_{it}^{m}$is the vector of macroeconomic variables that contribute to economic growth,

$\varepsilon_{it}$is the composite error term of both country specific and random disturbances

The general dynamic panel approach (autoregressive-distributed linear specification) as adapted from Casu and Girardone (2009) on a panel analysis of Granger-type causality between competition and efficiency in banking takes the form;

$y_{it} = \propto + \sum_{j=1}^{n} \alpha_j y_{i(t-j)} + \sum_{j=1}^{n} \beta_j x_{i(t-j)} + \theta_t + \varphi_i + \partial_{it}$………………………………(2)

Where y_{it} represents the dependent variable, $\propto$ represents the intercept, $y_{i(t-j)}$ represents the jth lag of the dependent variable, $x_{i(t-j)}$ represents the jth lag of the explanatory variables,α_j and β_j are the estimated parameters,θ_t represents the common time effect,φ_i represents the individual bank specific effect, and ∂_{it} is a disturbance term.

The estimation of an AR(2) model allows us to test the Granger causality joint hypothesis of $\beta_1 = \beta_2 = 0$. The direction of causality will also be shown by $\beta_1 + \beta_2$. Since we expect a causality to run in either of the directions, $y_{it}$and $x_{it}$are presented alternatively by a measure of economic growth and measure of financial development.

$\alpha_1 + \alpha_2$represents the represents how fast the dependent variable adjusts to equilibrium thus it reflect persistence. The coefficient shows by how much does the current values of the dependent variable is influenced by it past value.

The dynamic panel regression is estimated using a one-step system generalised method of moments (GMM) as suggested by Blundell and Bond (1998) building on the works of Arellano and Bover (1995). This methodology reduces bias and provides consistency which are obtained by using all available lagged values of the dependent variable along with the exogenous regressors as instruments. All the variables (dependant and independent) are modelled in growth rates.

The selected models for the static models (fixed effects, random effects and pooled OLS) to be used in this empirical study takes the form:

$GDP_{it} = \beta + \beta_1 DC_{it} + \beta_2 MS_{it} + \beta_3 VX_{it} + \beta_4 GGD_{it} + \beta_5 FDI_{it} + \beta_6 INF_{it} + u_i + \varepsilon_{it}$…………….......……(3a)

$DC_{it} = \beta + \beta_1 GDP_{it} + \beta_2 MS_{it} + \beta_3 VX_{it} + \beta_4 GGD_{it} + \beta_5 FDI_{it} + \beta_6 INF_{it} + u_i + \varepsilon_{it}$…………….......……(3b)

$MS_{it} = \beta + \beta_1 DC_{it} + \beta_2 GDP_{it} + \beta_3 VX_{it} + \beta_4 GGD_{it} + \beta_5 FDI_{it} + \beta_6 INF_{it} + u_i + \varepsilon_{it}$…………….......……(3c)

Where:β is the constant, VX_{it} is the (percentage change) volume of exports; GGD_{it} is the (percentage change) government gross debt; $INF_{it}$is the (percentage change) inflation rate; FDI_{it} is the (percentage change) Foreign Direct Investment; u_i is the individual level effect; and ε_{it} is the disturbance term.

The dynamic models in the study will be as follows:

$GDP_{it} = \beta_1 GDP_{it-1} + \beta_2 GDP_{it-2} + \beta_3 DC_{it-1} + \beta_4 DC_{it-2} + year + u_i + \varepsilon_{it}$…………………….......……..(4a)

$GDP_{it} = \beta_1 GDP_{it-1} + \beta_2 GDP_{it-2} + \beta_3 MS_{it-1} + \beta_4 MS_{it-2} + year + u_i + \varepsilon_{it}$…………………….......……;(4b)

$DC_{it} = \beta_1 GDP_{it-1} + \beta_2 GDP_{it-2} + \beta_3 DC_{it-1} + \beta_4 DC_{it-2} + year + u_i + \varepsilon_{it}$……………………….......……(4c)

$MS_{it} = \beta_1 GDP_{it-1} + \beta_2 GDP_{it-2} + \beta_3 MS_{it-1} + \beta_4 MS_{it-2} + year + u_i + \varepsilon_{it}$……………………….......……(4d)

Where; $it - 1$ and $it - 2$ are first and second lags of a variable, respectively, for country i at time t; $year$represents year dummies (control for temporal shocks),
Other variables are as previously defined.

3.3 Variable Justification

3.3.1 Financial Development Variables

The study is concerned only on the banking sector developments. Two (2) financial development indicators which are domestic credit to the private sector as a ratio of GDP and broad money ratio of GDP are utilised.

3.3.1.1 Domestic Credit to the Private Sector as a Percentage of GDP (DC)

The variable is better known as domestic credit to private sector by banks as a percentage of GDP. It is the financial resources provided to the private sector by other depository corporations except the central bank. For some countries, these claims may include credit to enterprise. King and Levine (1993) examined the Claims on Private Sector over GDP (PRIVY), which is calculated as credit to private sector as a ratio of GDP. It is believed that the financial sector will allocate the scarce credit more efficiently to the private sector. A positive (+) coefficient of domestic credit ratio to growth is expected which is in line with literature. The positive impact of the indicator on growth was also empirically established by Levine and Zervos (1998).

3.3.1.2 Broad Money as a Percentage of GDP (MS)

Broad money is inclusive of the total sum of currency outside of the banks, the demand deposits with exception of those of the central government, banks and traveller's checks, and other securities such as certificates of deposit and commercial paper. A positive coefficient of broad money ratio to growth is expected. Rousseau and Wachtel (2000) also use the same financial development variable and found a positive association with economic growth. Goldsmith (1969) and King and Levine (1993) are the first to examined the indicator.

3.3.2 Macroeconomic Variables

A number of macroeconomic variables that largely influence economic growth in Sub-Saharan countries have been selected and employed in static models. The variables includes volume of exports of goods and services, foreign direct investment, gross national savings, inflation and general government gross debt.

3.3.2.1 Foreign Direct Investment (% of GDP) (FDIs)

Foreign direct investment are believed to have a critical role to play in ensuring development in developing and emerging economies. They represents the amount of investment inflows into the respective countries by foreign investors. The study, therefore, expects a positive association of FDI and economic growth, as with the case on a study by Kavoussi (1984).

3.3.2.2 Exports Volumes (VX)

The exports are measured as volumes of exports of goods and services measured/approximated in domestic currency of the respective nation. The study expect a strong positive influence of exports to economic growth. Kavoussi (1984) also found a positive impact of exports on growth.

3.3.2.3 General Government Gross Debt (% of GDP) (GGD)

Literature strongly support the negative impact that government debt has to the development of any economy. The gross debt used includes the public and publicly guaranteed debt. Publicly guaranteed debt is private debt whose repayment is guaranteed by the government in case of default. The study also expects inverse relationship of GGD with economic growth which is in line with findings by Kumar and Woo (2010).

3.3.2.4 Inflation (INF)

Inflation reflects difficulties in economic environment which results in capital flights and depressed economic activities for the fear of making losses. As such, the study uses the percentage change in annual consumer price index and expects a negative (-) influence of inflation to growth. The CPI basket is considered broad enough for a good indicator which makes it a lot easier for the purpose of comparing prices and inflation as well as to determining its impact on economic growth. Demirguc-Kunt and Detragiache, (1998) proved inflation as a major macroeconomic variable with negative impact to growth.

3.3.2.5 Real Gross Domestic Product growth (GDP)

Real Gross Domestic Product growth rate is widely used measure of economic growth in literature. It stands as the next best proxy of economic growth of a nation as it accounts for the total values of the produced products by the country's own resources and within its boundaries. The indicator will serve for the provision of the citizens' sovereignty.

3.4 Diagnostic Test for Static Models

3.4.1 Panel Unit Root Test

The stationarity of the utilised variables was done using the panel unit root tests. Panel unit root will be tested by the Levin-Lin-Chu, Harris-Tzavalis, Im-Pesaran-Shin and PP-Fisher: chi-squared unit-root test. This helps by putting away the probability of having spurious results (Arellano and Bond, 1991). A number of methods for unit root test where used which could act as robustness check of the data under analysis. The null hypothesis of non-stationary variables should be rejected for our variables to be good for use in the model.

$H_{0:}$ The panel series is non stationarity.

$H_{1:}$ The panel series is stationarity.

The decision rule is if the p-values of the stationarity test is less that 5% then reject the reject the null hypothesis of non-stationary and conclude that the panel series are stationary.

3.4.2 Multi-collinearity Test

The Vector Inflation Factor (VIF) is going to be used in testing the availability of multi-collinearity. Lower levels of VIF are preferred to higher values to conclude that the model is free from problems associated with a multiple regression analysis. Kennedy (2008) argued for the maximum VIF of 10 while Rogerson (2001) recommended maximum value of 5.

$H_{0:}$ There is no Multicollinearity.

$H_{1:}$ There is Multicollinearity.

The decision rule is we do not reject the null hypothesis of no multicollinearity when the VIF is less than 10 and conclude that we have no multicollinearity.

3.4.3 Hausman Test

The fixed effect and random effects are the static models utilised in this study. In a fixed effect model account for the fact that each individual or cross section unit may have some special characteristics of its own and hence it the intercept in the regression is allowed to differ among individuals. A Random effects assumes that the intercept draws from a much larger population with a constant mean value. The Hausman (1978) test is to be used in order to determine the best model between the fixed and random effect models.

$H_{0:}$ The Random Effect model is appropriate.

$H_{1:}$ The Fixed Effect model is appropriate.

The decision rule is if the p-values of the Hausman test is less that 5% then reject the reject the null hypothesis of random effect and conclude that the fixed effect model is the best to adopt.

3.4.4 Breusch and Pagan Lagrangian multiplier

The test is applied to the static models to choose whether to adopt the pooled ordinary least squares (pooled OLS) or the random effect model. The test is only application when Hausman test has chosen the random effect model against the fixed effect model.

$H_{0:}$ The pooled OLS model is appropriate.

$H_{1:}$ The random effect model is appropriate.

The decision rule is if the p-values of Breusch and Pagan test is less that 5% then reject the reject the null hypothesis of pooled OLS model and conclude that the random effect model is the best.

3.5 Diagnostic test for dynamic models

3.5.1 Serial Correlation Test

The Arellano-Bond test for first order and second order serial correlation will be tested at 95% significance level (Arellano and Bond, 1991).

$H_{0:}$ There is no serial correlation

$H_{1:}$ There is serial correlation

The decision rule is if the p-values of Serial Correlation is less than 5% then reject the null hypothesis of no serial correlation and conclude that there is serial correlation.

3.5.2 Wald Test

Wald statistic of the null hypothesis that all the coefficients except the constant are zero will be tested to find out if the model is significance.

$H_{0:}$All the coefficients except the constant are zero

$H_{1:}$ All the coefficients are not equal to zero

The decision rule is if the p-values of Wald Test is less than 5% then reject the null hypothesis of all the coefficients except the constant are zero and conclude that the model is significant.

3.5.3 Sargan Test

The Sargan test for over identification in GMM dynamic estimation is also carried on the study to find out if the null of valid instruments is accepted or not.

$H_{0:}$Valid instruments

$H_{1:}$ Invalid instruments

The decision rule is if the p-values of Sargan test is less than 5% then reject the null hypothesis of valid instrument and conclude that the model has invalid instruments.

3.5.4 Joint Significance Test

The test is utilised on the variable of interest with its lags to determine if there is Granger-type causality to the dependent variable. The sign of the causation is also determined by the sum of the coefficients of the variable tested for joint significant.

$H_{0:}$There is no causality.

$H_{1:}$ There is causality.

The decision rule is if the p-values of the joint significance test is less than 5% then reject the null hypothesis of no causation and conclude that the variable has a causal relationship.

3.6 Data Source and Characteristics

A panel dataset of the key financial development indicators was constructed from 14 Southern African countries. The panel contains 139 and 140 observations, depending on the availability of the utilised variables. The period covered by the study was from 2006 to 2015 and the data frequency was annual. Domestic credit ratio, private credit ratio and foreign direct investment where taken from World Development Indicators (World Bank database). The volumes of exports, general government gross debt, inflation and real gross domestic product are obtainable from IMF database. The dataset was used to estimate the causal link between financial development and economic growth using panel data regressions. Compared to primary sources, secondary data can be easily and cheaply acquired. Besides, the study can better be dealt with secondary data. The data may, however, be prone to outliers from individual countries which could produce results which are not true representative of the actual facts in a particular country.

3.7 Conclusion

The just ended chapter highlighted the model to be used, justification of the variables, diagnostic test and data sources. Chapter Four is going to disclose the research findings, data presentation and interpretation.

CHAPTER FOUR

RESULTS PRESENTATION AND INTERPRETATION

4.0 Introduction

The diagnostic tests, presentation of results and their interpretations are done in this section. The study uses Stata 13 on the regressions. The researcher provide a link of results obtained to known empirical literature from other studies when interpreting the results.

4.1 Summary Statistics Results

Table 4.1: Summary Statistics Results

Variable	Obs	Mean	Std. Dev.	Min	Max
DC	140	8.3475	15.13001	-27.987	69.532
MS	139	4.5892	11.59392	-25.454	71.459
INF	140	7.9315	5.449434	-2.405	36.965
VX	140	4.3266	12.28803	-37.670	45.615
GGD	140	4.2477	24.08824	-62.860	129.496
FDI	140	0.3018	521.2198	-5692.265	1537.509
GDP	140	5.0364	3.542818	-7.653	22.593

Source: Author's Own Calculations with Stata 13

The summary statistics in Table 4.1 shows that foreign direct investment has the widest standard deviation which implies high variation in foreign investment levels within the countries under study. This is supported by differences in investor attraction through ease of doing business, climatic factors, and political stability, among other factors in Africa (IMF, 2016). Inflation, however, has low variation from one country to the other as comparable to other variable with a positive mean which implies a general increase in the consumer price index in the region under study.

4.2: Static Models Diagnostics Results

4.2.1: Panel Unit-Root Test

The study performed different methods of stationarity test for panel data to each variable that was included in the regressions. Different methods of panel stationarity test methods were utilised to account for the varying characteristics exhibited by each method. For example, the PP-Fisher is able to execute an unbalanced panel as compared to other methods which can only perform the test on strongly balanced panel. Broad money supply ratio is the only variable with unbalanced panel and only the PP-Fisher was able to be executed.

Table 4.2: Summary of Panel Unit-Root Test (In Levels)

Variable	Levin-Lin-Chu (p-values)	Harris-Tzavalis (p-values)	Im-Pesaran-Shin (p-values)	PP-Fisher:chi-squared (p-values)
DC	0.0000	0.0000	0.0001	0.0000
MS	-	-	-	0.0000
GGD	0.0000	0.0000	0.0010	0.0000
INF	0.0000	0.0115	0.0006	0.3182
VX	0.0000	0.0000	0.0000	0.0000
GDP	0.0000	0.0029	0.0020	0.0000
FDI	0.0000	0.0000	0.0000	0.0000

Source: Author's Own Calculations

As shown in Table 4.2, the null hypothesis of non-stationary variables was strongly rejected by the Levin-Lin-Chu, Harris-Tzavalis, Im-Pesaran-Shin and PP-Fisher unit-root test. As such, our variables are good to be used in the model.

4.2.2: Multi-Collinearity Test Results

Table 4.3: Summary of Multi-collinearity Test Results

	MODEL 1	MODEL 2	MODEL 3
Variable	**VIF**	**VIF**	**VIF**
DC	1.17	-	1.86
MS	-	1.24	1.57
INF	1.54	1.49	1.51
VX	1.18	1.17	1.20
GGD	1.17	1.17	1.19
FDI	1.18	1.18	1.21
Mean VIF	1.87	1.84	1.90

Source: Author's Own Calculations

Multi-collinearity test was also done using Vector Inflation Factor (VIF). As shown in Table 4.3, making reference to Kennedy (2008) and Rogerson (2001) we can conclude that the model is free from severe multi-collinearity since the average Vector Inflation Factor (VIF) is less than 5.

4.2.3: Hausman Test Results

Table 4.4: Summary of Hausman Test Results

Dependent Variable	Hausman Test
GDP	chi2(6) = 37.59 P-value = 0.0000
DC	chi2(6) = 8.37 P-value = 0.2123
MS	chi2(5) = -42.86 P-value = 0.2463

Source: Researchers' own computations

The Table 4.4 shows that the null hypothesis of random effect is rejected for the first model with GDP as the independent variable. The null hypothesis of no systematic differences between the two models is rejected at 95% significance level and it means the results from the fixed effects model produce efficient and consistent estimates. There is some unobserved heterogeneity amongst the countries. There was, however, no evidence to reject the hypothesis of homogenous groups for models with private credit ratio and broad money ratio implying the choice of random effect model according to Hausman (1978) test. Hausman test assumed homogeneity on the groups which supports the use of random effect models.

4.2.4: Breusch and Pagan Lagrangian Multiplier Test for Random Effects Results

Table 4.5: Summary of Breusch and Pagan Test Results

Dependent Variable	Breusch and Pagan Lagrangian multiplier test for random effects
GDP	-
DC	Chibar2(01) = 1.10; Prob > chibar2 = 0.1475
MS	Chibar2(01) = 0.00; Prob > chibar2 = 1.0000

Source: Researchers' own computations

Breusch and Pagan Lagrangian multiplier test for random effects was further tested on models which previously selected random effect model. As shown in Table 4.5, the null hypothesis of pooled OLS was not rejected against the alternative of random effect model. This gave the study high confidence on the need to use the Pooled OLS model. We therefore, utilised the pooled OLS model for models with private credit ration and broad money ration as dependent variables.

4.3: Dynamic Models Diagnostics Results

4.3.1: Wald Test Results

Table 4.6: Summary of Wald Test results

Dependent Variable	Wald Statistic
GDP	Wald chi2(5); Prob > chi2 = 0.000
DC	Wald chi2(5); Prob > chi2 = 0.000
MS	Wald chi2(5); Prob > chi2 = 0.000

Source: Researchers' own computations

The results for Wald test in Table 4.6 shows that null hypothesis that all the coefficients except the constant are zero is rejected with p-values of 0.0000, implying model significance.

4.3.2: Serial Correlation Results

SYS-GMM t−2 robust	Dependent variable y=GDP	Independent Variable x=DC
AR(1)	0.036	
AR(2)	0.090	
SYS-GMM t−2 robust	**Dependent variable y=GDP**	**Independent Variable x=MS**
AR(1)	0.040	
AR(2)	0.199	
SYS-GMM t−2 robust	**Dependent variable y=DC**	**Independent Variable x=GDP**
AR(1)	0.017	
AR(2)	0.767	
SYS-GMM t−2 robust	**Dependent variable y=MS**	**Independent Variable x=GDP**
AR(1)	0.022	
AR(2)	0.800	

Table 4.7: Summary of Serial Correlation Results

Source: Researchers' own computations

The serial correlation by Arellano-Bond test for first-differenced errors fails to reject the null hypothesis of no second order autocorrelation at 95% significance level. There is, however, autocorrelation at first order which support that the moments are valid since the independent variable should be correlated with the lag of dependent variable at such order (Blundell and Bond, 1998). As such, rejecting the null hypothesis of no autocorrelation of first-differenced errors at higher orders implies that the moment conditions are not valid.

4.3.3: Sargan Test Results

The Sargan test results are in Table 4.8 for over identification in GMM dynamic estimation. The null hypothesis of valid instruments cannot be rejected for all models under study at 5% level of significance. This mean that the model is correctly specified with no redundant variables (Blundell and Bond, 1998).

Table 4.8: Summary of Sargan Test Results

SYS-GMM t−2 robust	**Dependent variable y=GDP**	**Independent Variable x=DC**
Sargan/Hansen p-value	0.635	
Difference Sargan/Hansen	1.000	
SYS-GMM t−2 robust	**Dependent variable y=GDP**	**Independent Variable x=MS**
Sargan/Hansen p-value	0.966	
Difference Sargan/Hansen	0.554	
SYS-GMM t−2 robust	**Dependent variable y=DC**	**Independent Variable x=GDP**
Sargan/Hansen p-value	0.681	
Difference Sargan/Hansen	0.502	
SYS-GMM t−2 robust	**Dependent variable y=MS**	**Independent Variable x=GDP**
Sargan/Hansen p-value	0.833	
Difference Sargan/Hansen	0.729	

Source: Researchers' own computations

4.3: Regression Results Presentation

4.3.1: Static Models Results

The results for the fixed effect and pooled OLS models are as presented in this section. The dependent variable in table 4.9 is GDP, table 4.10 have private sector credit ratio as dependent variable while table 4.11 is fitted with broad money ratio as dependent variable.

Table 4.9: Summary of Fixed Model Results with GDP as Dependent Variable

Variables	Coefficient	Std. Error	t-Statistic	Prob.
DC	0.0577***	0.0191	3.02	0.003
MS	-0.0707***	0.0230	-3.07	0.003
VX	0.0763***	0.0189	4.03	0.000
GGD	-0.0559***	0.0096	-5.80	0.000
INF	-0.1480***	0.0490	-3.02	0.003
FDI	0.0002	0.0004	0.41	0.685
Constant	5.9619***	0.5156	11.56	0.000
Observations	139			
Number of countries	14			

Source: Researchers' own computations

Note: *** indicate significance at 1%, **, significance at 5% and *, significance at 10%

Table 4.10: Summary of Pooled OLS Model Results with DC as Dependent Variable

Variables	Coefficient	Std. Error	t-Statistic	Prob.
MS	0.7032***	0.0883	7.96	0.000
GDP	1.4194***	0.3233	4.39	0.000
VX	-0.2194**	0.0895	-2.45	0.015
GGD	0.01954	0.0448	0.44	0.664
INF	-0.0493	0.2001	-0.25	0.806
FDI	0.0024	0.0020	1.18	0.241
Constant	-0.7809	2.5369	-0.31	0.759
Observations	139			

Source: Researchers' own computations

Note: *** indicate significance at 1%, **, significance at 5% and *, significance at 10%

Table 4.11: Summary of Pooled OLS Models Results with MS as Dependent Variable

Variables	Coefficient	Std. Error	t-Statistic	Prob.
DC	0.4614***	0.0579	7.96	0.000
GDP	-0.5459*	0.2763	-1.98	0.050
VX	0.0701	0.0738	0.95	0.344
GGD	0.0219	0.0363	0.60	0.548
INF	-0.1444	0.1616	-0.89	0.373
FDI	-0.0013	0.0017	-0.81	0.422
Constant	4.2208**	2.0226	2.09	0.039
Observations	139			

Source: Researchers' own computations

Note: *** indicate significance at 1%, **, significance at 5% and *, significance at 10%

The data fits the static models and for the models with economic growth as a dependent variable. The results from static model shows that economic growth and broad money ratio have bilateral causality which is in line with the findings by Akinlo and Egbetunde (2010) on their study on African countries. The negative causal relationship is supported by the efforts by African authorities to improve terms-of-trade through monetary contraction in order to improve growth rates (IMF, 2016). Private sector credit ratio and economic growth also have a bilateral causality. The positive causal relationship conforms to the findings by Odo *et al* (2016) who also found a bilateral relationship in South Africa. As a result, the outcome from static model support both the demand-following and supply-following hypothesis by Patrick (1966). Growth rates of broad money as a ratio of GDP, however, provides an inverses association with economic growth. This may be explained by the strong need by African economies to improve their local currencies through monetary contractions which consequently leads to increased growth rates (IMF, 2016).

On the control variables, volume of exports provided the expected positive impact on growth which is in line with other findings on the drives for growth in African countries. Inflation and general government gross debt are significant and have a negative impact to growth which is conforming to the theory. Foreign direct investment, however showed insignificant results. The results are consistent with the findings by Aitekn and Harrison (1999) from their study in Venezuela. A study in Morocco by Mansfield and Romeo (1980) also fail to identify a positive effect of foreign direct investment on growth. Foreign direct investment was also found to have a crowding out effect on domestic investment (Hanson, 2010)

4.3.2 Dynamic Panel Model Results

The dynamic panel model was robustly estimated using a one-step system Generalised Method of Moment (GMM) estimator. Table 4.12 shows the results of the one-step system GMM and the Granger-type causality. For a model to be significant there must be significant Wald statistic of the null hypothesis that all the coefficients, except the constant are zero, insignificant Sargan/Hansen test, significant serial autocorrelation in the first-differenced errors, insignificant serial autocorrelation at higher order and significant joint significance test. The conditions of the significant GMM model was from contributions of Blundell and Bond (1998) and (Blundell, Bond, and Windmeijer, 2000).

In order to determine Granger-type causality, the study carried out tests of joint significance with first and second lags for the variables of interest and the sign of causation is determined by the tested sum of the coefficients. The null hypothesis of the Granger-type causality is there is no causal relationship while the null hypothesis states that there is causality.

Table 4.12: Dynamic Panel Models [one-step System GMM)]

Variables (y=GDP, x=DC)	Coefficient	Std. Error (robust)	z-Statistic	Prob.
GDP1	0.2852**	0.1225	2.33	0.020
GDP2	0.0565	0.0708	0.42	0.424
DC1	0.0267*	0.0139	1.92	0.055
DC2	0.0136	0.0130	1.04	0.299
Σ(DC)	0.0403**			
Test of β1+β2=0 (p-value)				0.0262
Variables (y=GDP, x=MS)	**Coefficient**	**Std. Error (robust)**	**z-Statistic**	**Prob.**
GDP1	0.3267***	0.1239	2.64	0.008
GDP2	-0.0517	0.0706	0.46	0.464
MS1	0.0388	0.0244	1.59	0.112
MS2	0.0048	0.0130	0.37	0.711
Σ(MS)	0.0436			
Test of β1+β2=0 p-value				0.1636
Variables (y=DC, x=GDP)	**Coefficient**	**Std. Error (robust)**	**z-Statistic**	**Prob.**
DC1	0.1541	0.1886	0.82	0.414
DC2	0.0789	0.0814	0.97	0.332
GDP1	1.1688***	0.3724	3.14	0.002
GDP2	0.1749	0.6293	0.28	0.781
Σ(GDP)	1.3437**			
Test of β1+β2=0 p-value				0.0414
Variables (y=MS, x=GDP)	**Coefficient**	**Std. Error (robust)**	**z-Statistic**	**Prob.**
MS1	0.0406	0.0737	0.55	0.582
MS2	0.0003	0.0526	0.00	0.996
GDP1	0.6810**	0.3109	2.19	0.028
GDP2	0.7116	0.5141	1.38	0.166
Σ(GDP)	1.3927**			
Test of β1+β2=0 p-value				0.0132

Source: Researchers' own computations

Note: *** indicate significance at 1%, **, significance at 5% and *, significance at 10%

The results from GMM are providing strong evidence of bilateral causality between economic growth and credit to the private sector over GDP. The results shows a positive causal relationship from the obtained positive sum on coefficients of causality. As a result, there is strong support for supply-leading and demand-following hypothesis by Patrick (1966). There is, however, unidirectional causality running from economic growth to broad money ratio. The results, however, shows a negative causal relationship from the obtained negative sum of coefficients on variables of interest which is in line with findings by (IMF, 2016). There is strong support for demand-following hypothesis by Patrick (1966).

4.4 Conclusion

The presentation and interpretation of results are covered in this chapter. The results from static models shows bidirectional causality on both private sector credit ratio and broad money ratio with GDP. There is also bidirectional causality between private sector credit ratio and economic growth from the dynamic models. This provides strong support of both supply-following and demand-leading hypothesis by Patrick (1966). Broad money ratio, however, exhibited unidirectional causality to the GDP. This provides strong support of demand-leading hypothesis by Patrick (1966). Conclusively, from both approaches we can conclude to say there is bilateral causal relationship between economic and all the considered financial development indicators.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

The Chapter 5 is aimed at giving the study concluding remarks. It provides the summary of key findings, conclusion, policy recommendations and suggestions for further studies.

5.1 Summary of the Study

The study seeks to investigate the relationship that exist on economic growth and some selected financial development indicators in Southern Africa region. Financial development is measured by domestic credit to the private sector over GDP and broad money over GDP. A panel of 14 Southern Africa countries is included in the sample for the period 2006 to 2015. The study utilises static and dynamic panel models. Fixed Effect and Random Effect and system GMM models are the econometric methods used in the analysis.

The region has been characterised by failing terms-of-trade which forced a number of monetary authorities to lower the growth in monetary aggregates or to raise their policy rates, during the period under review. This has inspired the use of broad money ratio as a financial development indicator. Besides, there has been also a significant shift of credit from the private sector to the public sector. The study has then utilised the private sector credit ratio to empirically establish the analysis.

The study obtained mixed results from different methods used. The results from fixed effect model shows bidirectional causality on both private sector credit ratio and broad money ratio with GDP. Using the Granger-type causality on system GMM, there is also bidirectional causality between economic growth and private sector credit. Unidirectional causality running from economic growth to broad money ratio from system GMM Granger-type causality is also present. Conclusively, it is convincing that financial development and growth depends on each other and hence the applicability of both supply-leading and demand-leading hypothesis by Patrick (1966). As such, financial development is a crucial element needed for the development purpose in the Southern Africa region.

5.2 Conclusion

Conclusively, it is shown in the study that credit to the private sector over GDP and broad money over GDP are both significant in influencing economic growth in Southern Africa. This then calls for prioritization of credit distribution within sectors and effective management monetary policies.

5.3 Policy Recommendations

The recommendations for policy will hinge on the need to facilitate the allocation of credit to the private sector and effective regulation of monetary policies. As such, the study can come up with a number of effective policy options which will restore a conducive environment for increase production in the Southern Africa region.

Given the positive causality that private credit has to GDP, there is need to avoid crowding out effect of the private sector by the government, for example, through minimum issuance of treasury bills. Issuing of treasury bills implies mopping-up of the scarce liquidity from the most productive private sector to claims on public sector. This will then lead to unproductive distribution of credit within the economies which translates to redundant productivity.

Again, the positive causal relationship that private credit ratio has to growth, the assumption of non-performing loans will see a transfer of credit from the public sector to the most productive private sector .Non-performing loans management by both banks and the government to ensure smooth economic activity which are free from bottlenecks. This gesture would ease the burden of private prayers and gives room for expansion which leads to effective service provision.

Selective credit in such a way that financial institutions are inspired to extent credit to those who intent to invest and not for consumption and/or any other unproductive purposes. This would ensure increased returns from the scarce credit in circulation. As such, prospects of improvements in growth in the region would be widened. Moral-suasion by the central banks will also ensure effective utilisation of credit by the private players.

There is need for effective monetary policies, for example, through interest rates and effective regulation of monetary aggregates. The countries in the region can safely increase interest rates and/or use reduce monetary aggregates in a bid to improve term-of-trade problems which leads to increase in national output. This is supported by the negative coefficients that broad money have to GDP.

5.4 Suggestions for Future Researchers

The need to also include market-based financial development is recommended. This enable research to be conclusive that is including all factors that may matter in the analysis. This might be necessary given possibility of dynamics which comes with development despite the wide literature showing non-relevance of market-based financial development in developing economies which comprise the greater part of our sample.

The inclusion of the 15th country (Zimbabwe) in the Southern Africa region under study for population results and interpretations as compared to sample based conclusions. It is also encouraged to use large samples size which would give high chances to use moving average data which are of low frequency and more consistent for modelling.

The adoption of other necessary explanatory variables that may highly contribute to economic growth in Southern Africa is also crucial. These variable may include the exchange rates from the African economies against the most traded United State dollar.

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JHAPPENDICIES

Appendix 1: The Southern Africa Countries Included

Angola

Botswana

Congo

Lesotho

Mauritius

Malawi

Madagascar

Namibia

Mozambique

Seychelles

South Africa

Swaziland

Tanzania

Zambia

Appendix 2: List of Country Abbreviations

AGO	Angola	ERI	Eritrea	MLI	Mali	SWZ	Swaziland
BDI	Burundi	ETH	Ethiopia	MOZ	Mozambique	SYC	Seychelles
BEN	Benin	GAB	Gabon	MUS	Mauritius	TCD	Chad
BFA	Burkina Faso	GHA	Ghana	MWI	Malawi	TGO	Togo
BWA	Botswana	GIN	Guinea	NAM	Namibia	TZA	Tanzania
CAF	Central African Republic	GMB	Gambia, The	NER	Niger	UGA	Uganda
CIV	Côte d'Ivoire	GNB	Guinea-Bissau	NIG	Nigeria	ZAF	South Africa
CMR	Cameroon	GNQ	Equatorial Guinea	RWA	Rwanda	ZMB	Zambia
COD	Congo, Dem. Rep. of	KEN	Kenya	SEN	Senegal	ZWE	Zimbabwe
COG	Congo, Rep. of	LBR	Liberia	SLE	Sierra Leone		
COM	Comoros	LSO	Lesotho	SSD	South Sudan		
CPV	Cabo Verde	MDG	Madagascar	STP	São Tomé & Príncipe		

Appendix 3: Data

country	year	Domestic credit to private sector (% of GDP)	Domestic credit to private sector (% of GDP) growth (DC)	Broad money (% of GDP)	Broad money (% of GDP) growth (MS)	Gross Domestic Product	Gross Domestic Product growth (GDP)	Inflation, average consumer prices growth (INF)	Volume of exports of goods and services growth (X)	General government gross debt (% of GDP)	General government gross debt growth (% of GDP) growth (GGD)	Foreign direct investment, net inflows (% of GDP)	Foreign direct investment, net inflows (% of GDP) growth (FDI)
Angola	2006	8.054164	46.322777	18.3288	15.28	906.46	20.735	13.305	14.255	18.697	-47.68	-0.0902497	-98.05
Angola	2007	10.55377	31.034948	18.3942	0.36	1,111.26	22.593	12.249	17.501	16.066	-14.07	-1.4778463	1,537.51
Angola	2008	12.63261	19.697628	22.4368	21.98	1,264.80	13.817	12.465	10.105	16.647	3.62	1.9945477	-234.96
Angola	2009	21.41635	69.532234	38.47	71.46	1,295.32	2.413	13.721	-2.64	22.71	36.42	2.9212194	46.46
Angola	2010	19.86792	-7.2301094	35.335	-8.15	1,339.46	3.408	14.48	-3.266	44.291	95.03	-3.9131508	-233.96
Angola	2011	20.16967	1.5187562	37.557	6.29	1,391.95	3.919	13.484	-5.404	33.801	-23.68	-2.9042349	-25.78
Angola	2012	22.2082	10.106929	34.9912	-6.83	1,463.71	5.155	10.285	3.838	29.487	-12.76	-5.9775147	105.82
Angola	2013	23.35682	5.1720253	36.4797	4.25	1,563.44	6.814	8.782	0.064	32.874	11.49	-5.7000239	-4.64
Angola	2014	22.85704	-2.13976	41.004	12.40	1,638.55	4.804	7.298	-2.115	40.661	23.69	1.5158125	-126.59
Angola	2015	27.18487	18.934359	46.3573	13.06	1,687.83	3.007	10.287	7.85	64.239	57.99	9.044573	496.68
Botswana	2006	20.38803	3.6229191	41.5648	-6.44	59.107	8.364	11.553	3.133	6.228	-15.47	4.8029307	13.20
Botswana	2007	22.57108	10.70752	48.0943	15.71	64.001	8.28	7.077	8.481	8.246	32.40	4.5221618	-5.85
Botswana	2008	25.68898	13.813711	52.4991	9.16	67.996	6.242	12.623	-2.479	7.652	-7.20	4.7593849	5.25
Botswana	2009	28.82275	12.198871	52.7029	0.39	62.793	-7.653	8.108	-37.67	17.561	129.50	2.0326941	-57.29
Botswana	2010	27.10223	-5.969311	49.3397	-6.38	68.17	8.564	6.95	16.022	19.37	10.30	1.7078741	-15.98
Botswana	2011	26.77056	-1.2237702	41.74	-15.40	72.293	6.048	8.464	27.547	20.318	4.89	8.7425453	411.90
Botswana	2012	31.19639	16.532457	44.0023	5.42	75.515	4.456	7.533	-18.894	18.926	-6.85	3.3171855	-62.06
Botswana	2013	31.74909	1.7716751	42.9487	-2.39	82.961	9.86	5.886	6.028	17.579	-7.12	2.6895969	-18.92
Botswana	2014	30.98432	-2.4087998	39.1968	-8.74	85.62	3.205	4.403	4.143	17.665	0.49	3.2441931	20.62
Botswana	2015	33.77027	8.9914964	45.9399	17.20	85.401	-0.255	3.041	5.54	17.21	-2.58	2.7351114	-15.69
Congo, Rep.	2006	2.097239	-13.115875	15.3444	16.81	1,138.00	6.236	4.658	5.819	98.816	-8.73	19.242566	46.23
Congo, Rep.	2007	2.26732	8.1097594	17.9719	17.12	1,119.99	-1.582	2.595	-16.147	97.957	-0.87	31.429461	63.33
Congo, Rep.	2008	3.125112	37.83284	18.1045	0.74	1,182.40	5.572	6.02	5.37	68.063	-30.52	17.133633	-45.49
Congo, Rep.	2009	4.891989	56.53803	22.2661	22.99	1,270.72	7.469	4.339	15.467	61.626	-9.46	13.277987	-22.50
Congo, Rep.	2010	6.50979	33.070414	22.3794	0.51	1,381.82	8.743	5	13.421	22.888	-62.86	7.7318891	-41.77
Congo, Rep.	2011	7.730681	18.754694	26.9932	20.62	1,428.94	3.41	1.76	-1.272	33.087	44.56	15.111018	95.44
Congo, Rep.	2012	9.544972	23.468703	31.5321	16.81	1,483.42	3.813	5.01	-5.426	34.141	3.19	15.7326	4.11
Congo, Rep.	2013	11.27064	18.079349	31.9745	1.40	1,532.70	3.322	4.632	-12.971	38.184	11.84	20.686956	31.49
Congo, Rep.	2014	14.03302	24.509534	36.0787	12.84	1,637.67	6.849	0.912	3.902	47.511	24.43	38.809977	87.61
Congo, Rep.	2015	21.9696	56.556425	44.1384	22.34	1,675.61	2.317	2.005	-3.529	70.593	48.58	17.375789	-55.23
Lesotho	2006	7.195891	2.0548271	28.7783	18.76	8.642	4.417	6.337	19.261	62.585	3.85	1.3511589	-17.16
Lesotho	2007	9.059366	25.896381	31.7362	10.28	9.073	4.993	9.177	11.038	58.163	-7.07	4.1421562	206.56
Lesotho	2008	9.308277	2.7475548	31.5129	-0.70	9.538	5.115	10.688	24.721	50.825	-12.62	0.5869881	-85.83
Lesotho	2009	11.60339	24.656729	36.2673	15.09	9.969	4.519	5.852	-7.222	37.618	-25.99	4.8851128	732.23
Lesotho	2010	12.36187	6.536666	37.5589	3.56	10.654	6.878	3.382	6.135	35.245	-6.31	1.272579	-73.95
Lesotho	2011	13.09527	5.9327824	32.9071	-12.39	11.136	4.52	5.986	18.608	37.98	7.76	2.1881173	71.94
Lesotho	2012	16.99035	29.744174	32.6585	-0.76	11.724	5.282	5.532	-0.899	40.328	6.18	2.1246776	-2.90
Lesotho	2013	18.42583	8.4487897	35.8926	9.90	12.143	3.576	5.029	9.594	43.367	7.54	2.0176366	-5.04
Lesotho	2014	18.49588	0.3801903	32.678	-8.96	12.562	3.448	4.019	13.227	49.527	14.20	3.7205718	84.40
Lesotho	2015	18.23219	-1.4256684	34.8765	6.73	12.917	2.825	5.316	15.135	58.329	17.77	4.9700335	33.58
Mauritius	2006	68.60234	-8.7465443	93.113	-8.90	213.444	4.514	8.93	-1.932	51.015	-4.70	1.5188654	128.46
Mauritius	2007	71.67467	4.4784726	93.7728	0.71	226.017	5.891	8.827	19.171	47.283	-7.32	4.1810804	175.28
Mauritius	2008	81.76213	14.073945	96.503	2.91	238.473	5.511	9.731	-15.575	44.03	-6.88	3.7808884	-9.57
Mauritius	2009	80.04581	-2.0991594	96.2539	-0.26	245.744	3.049	2.516	12.14	52.269	18.71	2.8117551	-25.63
Mauritius	2010	85.2779	6.5363712	97.4913	1.29	255.82	4.1	2.929	3.704	52.038	-0.44	4.2980026	52.86
Mauritius	2011	89.2581	4.6673227	96.6398	-0.87	265.762	3.886	6.526	4.97	52.279	0.46	3.7623205	-12.46
Mauritius	2012	98.79949	10.689665	98.5664	1.99	274.343	3.229	3.852	4.761	51.473	-1.54	5.0478548	34.17
Mauritius	2013	106.2603	7.5514972	98.1771	-0.39	283.083	3.186	3.545	-3.957	53.861	4.64	2.4183868	-52.09
Mauritius	2014	98.73223	-7.0845839	101.401	3.28	293.323	3.617	3.218	12.362	56.152	4.25	3.2681056	35.14
Mauritius	2015	102.768	4.087571	106.953	5.47	303.589	3.5	1.285	-6.075	58.601	4.36	1.7830371	-45.44
Malawi	2006	5.102492	26.214952	11.5595	-7.32	766.813	4.7	13.904	10.804	46.872	19.68	0.8894785	-76.72
Malawi	2007	5.478204	7.363312	13.839	19.72	840.427	9.6	7.961	43.548	47.383	1.09	2.8069384	215.57
Malawi	2008	9.113463	66.358586	18.6758	34.95	904.633	7.64	8.716	6.791	40.17	-15.22	3.6726228	30.84
Malawi	2009	10.87478	19.326533	19.9126	6.62	979.972	8.328	8.416	-27.574	42.613	6.08	0.7930285	-78.41
Malawi	2010	13.82962	27.17149	22.1238	11.10	1,047.34	6.874	7.409	41.873	62.86	47.51	1.3943321	75.82
Malawi	2011	13.93239	0.7430892	25.0913	13.41	1,098.17	4.854	7.621	-9.597	88.469	40.74	10.180347	630.12
Malawi	2012	14.57426	4.6070858	25.7327	2.56	1,118.88	1.886	21.296	4.028	89.47	1.13	-0.1485808	-101.46
Malawi	2013	12.45304	-14.554568	25.9538	0.86	1,177.07	5.2	28.279	23.004	100.323	12.13	8.3090309	-5,692.27
Malawi	2014	11.40364	-8.4268975	23.9777	-7.61	1,244.16	5.7	23.775	4.294	94.581	-5.72	9.8771726	18.87
Malawi	2015	12.25859	7.4972319			1,280.86	2.95	21.858	-4.273	82.034	-13.27	8.0472672	-18.53
Madagascar	2006	10.08173	2.0622726	21.7409	8.00	6,216.19	5.399	10.766	6.837	37.367	-56.78	5.3424242	215.14
Madagascar	2007	10.15827	0.759227	22.5768	3.84	6,615.27	6.42	10.288	22.977	32.75	-12.36	10.750347	101.23
Madagascar	2008	11.17076	9.9671326	21.7906	-3.48	7,092.00	7.207	9.297	4.344	31.49	-3.85	12.052452	12.11
Madagascar	2009	11.51583	3.0889989	23.3208	7.02	6,756.81	-4.726	8.954	-13.189	33.678	6.95	15.126024	25.50
Madagascar	2010	11.69482	1.5543061	23.4603	0.60	6,774.59	0.263	9.247	-5.288	31.69	-5.90	9.2750658	-38.68
Madagascar	2011	11.01203	-5.838388	24.9394	6.30	6,873.12	1.455	9.483	10.96	32.181	1.55	7.4647212	-19.52
Madagascar	2012	11.01579	0.0341073	24.5736	-1.47	7,081.20	3.027	5.714	8.487	33.029	2.64	8.1705757	9.46
Madagascar	2013	11.9359	8.35265	23.8389	-2.99	7,240.90	2.255	5.826	5.879	33.891	2.61	5.3439169	-34.60
Madagascar	2014	12.87725	7.8867382	24.1712	1.39	7,481.00	3.316	6.08	3.127	34.651	2.24	3.285258	-38.52
Madagascar	2015	13.3348	3.553173	25.117	3.91	7,714.15	3.117	7.404	-3.018	35.533	2.55	5.3134173	61.74

Seychelles	2006	22.76468	-8.1636708	89.8329	-7.17	5.61	9.406	-1.858	8.19	132.509	-8.02	13.828529	57.44
Seychelles	2007	24.79587	8.9225732	66.9664	-25.45	6.195	10.418	5.324	2.685	130.749	-1.33	17.021494	23.09
Seychelles	2008	27.87654	12.424113	64.8982	-3.09	6.062	-2.141	36.965	-10.753	130.009	-0.57	18.592382	9.23
Seychelles	2009	20.07479	-27.986795	55.501	-14.48	5.995	-1.107	31.754	12.038	121.292	-6.70	19.855097	6.79
Seychelles	2010	24.44605	21.774869	62.1538	11.99	6.352	5.945	-2.405	-11.187	81.894	-32.48	16.474828	-17.02
Seychelles	2011	22.24555	-9.0014251	57.5605	-7.39	6.693	5.379	2.559	-3.032	77.289	-5.62	13.439396	-18.42
Seychelles	2012	20.03513	-9.9364731	47.7472	-17.05	6.939	3.677	7.11	8.155	82.538	6.79	54.062102	302.27
Seychelles	2013	20.05373	0.0928205	54.8942	14.97	7.289	5.044	4.339	14.249	68.796	-16.65	4.0599985	-92.49
Seychelles	2014	23.75219	18.442776	65.2151	18.80	7.742	6.205	1.386	13.031	68.629	-0.24	7.6136845	87.53
Seychelles	2015	24.2264	1.9964737	63.5045	-2.62	8.186	5.743	4.042	17.035	69	0.54	7.3653726	-3.26
Namibia	2006	48.19858	-4.9841166	41.6787	10.80	35.573	3.948	4.961	17.564	23.897	-8.26	7.6424692	41.29
Namibia	2007	48.23149	0.0682906	40.2843	-3.35	36.87	3.646	6.548	0.635	19.388	-18.87	7.6627347	0.27
Namibia	2008	46.56347	-3.4583626	41.7069	3.53	37.847	2.65	9.095	19.733	18.243	-5.91	8.8346415	15.29
Namibia	2009	47.98279	3.0481485	63.4607	52.16	37.959	0.296	9.452	-2.078	15.947	-12.59	5.5988637	-36.63
Namibia	2010	47.97484	-0.0165866	62.4304	-1.62	40.251	6.039	4.875	1.987	15.502	-2.79	6.7978763	21.42
Namibia	2011	48.5398	1.1776295	64.0455	2.59	42.301	5.091	5.006	-4.311	23.248	49.97	5.9992661	-11.75
Namibia	2012	48.47009	-0.1436131	57.3911	-10.39	44.442	5.062	6.722	-1.053	23.388	0.60	8.2762338	37.95
Namibia	2013	47.84597	-1.2876509	56.178	-2.11	46.955	5.654	5.601	0.801	23.208	-0.77	6.7128587	-18.89
Namibia	2014	49.63639	3.7420592	53.3089	-5.11	49.987	6.459	5.348	-4.079	23.623	1.79	3.1543166	-53.01
Namibia	2015	53.75913	8.305887	55.8897	4.84	52.634	5.295	3.396	0.37	33.701	42.66	9.2230709	192.40
Mozambique	2006	11.18091	11.309998	25.5785	4.06	245.911	9.851	13.245	7.677	46.611	-33.56	3.0214061	90.64
Mozambique	2007	11.46383	2.5304072	27.7225	8.38	264.172	7.426	8.161	-6.949	35.99	-22.79	4.4486048	47.24
Mozambique	2008	15.61026	36.169666	28.8989	4.24	282.337	6.876	10.326	9.949	36.283	0.81	5.5798913	25.43
Mozambique	2009	21.83263	39.86072	35.6594	23.39	300.27	6.351	3.255	-1.881	41.887	15.45	8.5238832	52.76
Mozambique	2010	24.18244	10.762846	38.6881	8.49	320.351	6.688	12.699	-24.336	43.326	3.44	12.393378	45.40
Mozambique	2011	23.04678	-4.6962384	37.6749	-2.62	343.153	7.118	10.351	20.191	38.026	-12.23	27.902599	125.14
Mozambique	2012	24.21258	5.0584127	42.9471	13.99	367.854	7.198	2.091	45.615	40.098	5.45	38.771052	38.95
Mozambique	2013	27.91815	15.304317	44.8797	4.50	394.123	7.141	4.208	5.103	53.125	32.49	41.809636	7.84
Mozambique	2014	31.68309	13.485653	49.7332	10.81	423.462	7.444	2.287	2.057	62.372	17.41	29.472094	-29.51
Mozambique	2015	34.82165	9.9061116	56.3262	13.26	451.452	6.61	2.392	2.11	86.024	37.92	26.125036	-11.36
Tanzania	2006	9.344234	15.80688	22.1665	-0.33	24,681.31	4.661	7.251	-2.083	32.841	-29.76	2.1656584	-60.81
Tanzania	2007	11.27989	20.715001	23.248	4.88	26,770.43	8.464	7.028	-0.413	21.598	-34.23	2.704487	24.88
Tanzania	2008	11.89508	5.4538371	22.7645	-2.08	28,260.63	5.567	10.276	-1.522	21.515	-0.38	5.0542256	86.88
Tanzania	2009	11.20137	-5.8318712	23.2729	2.23	29,781.72	5.382	12.144	-2.44	24.359	13.22	3.333931	-34.04
Tanzania	2010	11.72598	4.6833922	25.1224	7.95	31,675.50	6.359	7.192	7.039	27.343	12.25	5.7730682	73.16
Tanzania	2011	12.48962	6.5123744	24.6791	-1.76	34,179.30	7.905	12.691	8.428	27.842	1.82	3.628721	-37.14
Tanzania	2012	12.91241	3.3851829	23.8687	-3.28	35,936.46	5.141	16.001	2.244	29.151	4.70	4.6041182	26.88
Tanzania	2013	12.81615	-0.7454871	22.7005	-4.89	38,546.55	7.263	7.87	3.871	30.901	6.00	4.7080952	2.26
Tanzania	2014	13.70507	6.9359084	23.3499	2.86	41,231.36	6.965	6.132	7.051	33.795	9.37	4.2420507	-9.90
Tanzania	2015	15.02721	9.6470853	24.339	4.24	44,100.81	6.959	5.588	5.893	36.516	8.05	4.2968594	1.29
Swaziland	2006	18.97808	10.836171	20.156	14.77	31.785	4.45	5.2	-12.49	14.518	9.74	3.8059759	-357.90
Swaziland	2007	21.17811	11.592519	22.2542	10.41	33.05	3.98	8.076	3.152	15.96	9.93	1.1150775	-70.70
Swaziland	2008	20.27251	-4.2761311	22.722	2.10	34.465	4.281	12.657	-26.941	14.291	-10.46	3.2626515	192.59
Swaziland	2009	20.56188	1.4273908	25.4595	12.05	35.105	1.857	7.448	6.243	10.317	-27.81	1.8377695	-43.67
Swaziland	2010	19.06057	-7.3014196	25.1149	-1.35	35.597	1.403	4.509	3.709	13.496	30.81	2.9970948	63.08
Swaziland	2011	22.33449	17.176432	24.3743	-2.95	36.037	1.236	6.107	-9.299	13.851	2.63	1.8792733	-37.30
Swaziland	2012	19.46355	-12.854311	24.1627	-0.87	37.128	3.027	8.94	9.361	14.355	3.64	1.8428843	-1.94
Swaziland	2013	20.91606	7.4627367	25.1507	4.09	38.223	2.949	5.62	2.002	14.516	1.12	0.6385284	-65.35
Swaziland	2014	20.82955	-0.4136002	23.8711	-5.09	39.16	2.45	5.683	5.636	13.427	-7.50	0.5917547	-7.33
Swaziland	2015	20.01317	-3.9193411	25.1565	5.38	39.81	1.661	4.96	9.295	16.999	26.60	0.7692464	29.99
South Africa	2006	73.62445	11.717899	73.1851	9.28	2,491.30	5.604	4.663	7.463	31.355	-5.59	0.2294562	-90.93
South Africa	2007	78.29413	6.3425773	79.086	8.06	2,624.84	5.36	7.116	7.828	27.061	-13.69	2.1998846	858.74
South Africa	2008	76.68677	-2.0529764	80.7999	2.17	2,708.60	3.191	11.536	1.55	26.506	-2.05	3.4470155	56.69
South Africa	2009	74.59646	-2.7257825	77.6779	-3.86	2,666.94	-1.538	7.13	-17.024	30.078	13.48	2.5763942	-25.26
South Africa	2010	70.35181	-5.6901481	75.7996	-2.42	2,748.01	3.04	4.257	7.718	34.675	15.28	0.9839557	-61.81
South Africa	2011	67.5855	-3.9321112	74.6356	-1.54	2,838.26	3.284	5	3.496	38.227	10.24	0.9940206	1.02
South Africa	2012	68.62892	1.5438505	72.9398	-2.27	2,901.08	2.213	5.654	0.794	40.999	7.25	1.1671804	17.42
South Africa	2013	67.27483	-1.9730603	70.83	-2.89	2,968.68	2.33	5.752	3.633	43.986	7.29	2.2395707	91.88
South Africa	2014	67.01888	-0.3804489	70.7354	-0.13	3,017.04	1.629	6.067	3.281	46.895	6.61	1.6486131	-26.39
South Africa	2015	68.24127	1.8239492	74.13	4.80	3,055.19	1.265	4.588	4.096	49.778	6.15	0.5007344	-69.63
Zambia	2006	8.080419	23.761944	18.0616	16.55	69.106	7.904	9.017	6.303	24.999	49.53	4.8271287	12.68
Zambia	2007	9.624809	19.112751	18.4837	2.34	74.878	8.352	10.655	3.096	21.932	-12.27	9.4181117	95.11
Zambia	2008	12.17331	26.478409	19.1017	3.34	80.698	7.774	12.449	7.618	19.196	-12.47	5.2405081	-44.36
Zambia	2009	9.953457	-18.235379	17.8374	-6.62	88.139	9.22	13.392	20.01	20.522	6.91	4.5327798	-13.50
Zambia	2010	9.148021	-8.0920239	18.4296	3.32	97.216	10.298	8.5	20.51	18.892	-7.94	8.5331978	88.26
Zambia	2011	10.01172	9.4413723	19.1215	3.75	102.675	5.616	8.658	2.204	20.803	10.12	4.7250441	-44.63
Zambia	2012	11.93316	19.191917	19.5767	2.38	110.45	7.573	6.575	27.862	24.911	19.75	6.7892986	43.69
Zambia	2013	11.64177	-2.4418381	20.5129	4.78	116.118	5.132	6.978	21.7	25.915	4.03	7.4871297	10.28
Zambia	2014	13.33064	14.506929	20.927	2.02	121.953	5.025	7.811	-3.429	33.606	29.68	5.5534588	-25.83
Zambia	2015	15.67778	17.607148	25.7726	23.15	125.612	3	10.107	-11.092	56.282	67.48	7.481503	34.72

Source: IMF and World Bank Databases (2017)

Appendix 4: Summary Statistics

. sum GDPc dcbc DCc MSc Xc GGDc Infc FDIc

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPc	140	5.036357	3.542818	-7.653	22.593
dcbc	140	8.347464	15.13001	-27.98679	69.53223
DCc	140	8.125444	14.61687	-27.98679	69.27953
MSc	139	4.58921	11.59392	-25.45448	71.45919
Xc	140	4.326593	12.28803	-37.67	45.615
GGDc	140	4.247704	24.08824	-62.85983	129.4956
Infc	140	7.931493	5.449434	-2.405	36.965
FDIc	140	.3017736	521.2198	-5692.265	1537.509

Appendix 5: Panel Unit-Root Test
Real Gross Domestic Product (GDP)

```
. xtunitroot llc GDPc

Levin-Lin-Chu unit-root test for GDPc
-------------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -10.4218
 Adjusted t*          -7.2807       0.0000


. xtunitroot ht GDPc, trend

Harris-Tzavalis unit-root test for GDPc
---------------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N -> Infinity
Panel means:  Included                                     T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                    Statistic           z           p-value
------------------------------------------------------------------------------
 rho                  0.1119        -2.7566        0.0029


. xtunitroot ips GDPc, demean

Im-Pesaran-Shin unit-root test for GDPc
---------------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: Some panels are stationary                Number of periods =     10

AR parameter: Panel-specific                  Asymptotics: T,N -> Infinity
Panel means:  Included                                           sequentially
Time trend:   Not included                    Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                                Fixed-N exact critical values
                    Statistic      p-value          1%         5%        10%
------------------------------------------------------------------------------
 t-bar               -2.4068                     -2.140     -1.950     -1.850
 t-tilde-bar         -1.8296
 Z-t-tilde-bar       -2.8803        0.0020


. xtunitroot fisher GDPc, pperron lags(1)

Fisher-type unit-root test for GDPc
Based on Phillips-Perron tests
-----------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: At least one panel is stationary          Number of periods =     10

AR parameter:    Panel-specific               Asymptotics: T -> Infinity
Panel means:     Included
Time trend:      Not included
Newey-West lags: 1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)    P       96.0025       0.0000
 Inverse normal             Z       -4.5092       0.0000
 Inverse logit t(74)        L*      -6.2269       0.0000
 Modified inv. chi-squared Pm        9.0872       0.0000
------------------------------------------------------------------------------
```

Gross Government Debt (GGD)

```
. xtunitroot llc GGDc

Levin-Lin-Chu unit-root test for GGDc
-------------------------------------
Ho: Panels contain unit roots              Number of panels  =     14
Ha: Panels are stationary                  Number of periods =     10

AR parameter: Common                       Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic     p-value
------------------------------------------------------------------------------
 Unadjusted t        -20.9885
 Adjusted t*         -19.5061       0.0000
```

```
. xtunitroot ht GGDc, trend

Harris-Tzavalis unit-root test for GGDc
---------------------------------------
Ho: Panels contain unit roots              Number of panels  =     14
Ha: Panels are stationary                  Number of periods =     10

AR parameter: Common                       Asymptotics: N -> Infinity
Panel means:  Included                                  T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                     Statistic          z         p-value
------------------------------------------------------------------------------
 rho                  -0.0556       -4.5110       0.0000
```

```
. xtunitroot ips GGDc, demean

Im-Pesaran-Shin unit-root test for GGDc
---------------------------------------
Ho: All panels contain unit roots          Number of panels  =     14
Ha: Some panels are stationary             Number of periods =     10

AR parameter: Panel-specific               Asymptotics: T,N -> Infinity
Panel means:  Included                                      sequentially
Time trend:   Not included                 Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                     Statistic     p-value          1%         5%        10%
------------------------------------------------------------------------------
 t-bar                -2.5936                    -2.140     -1.950     -1.850
 t-tilde-bar          -1.8730
 Z-t-tilde-bar        -3.1050       0.0010
```

```
. xtunitroot fisher GGDc, pperron lags(1)

Fisher-type unit-root test for GGDc
Based on Phillips-Perron tests
-----------------------------------
Ho: All panels contain unit roots          Number of panels  =     14
Ha: At least one panel is stationary       Number of periods =     10

AR parameter:   Panel-specific             Asymptotics: T -> Infinity
Panel means:    Included
Time trend:     Not included
Newey-West lags: 1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P       121.0632       0.0000
 Inverse normal            Z        -5.0432       0.0000
 Inverse logit t(74)       L*       -8.2364       0.0000
 Modified inv. chi-squared Pm       12.4361       0.0000
```

Inflation (INF)

```
. xtunitroot llc Infc

Levin-Lin-Chu unit-root test for Infc
-------------------------------------
Ho: Panels contain unit roots                Number of panels  =     14
Ha: Panels are stationary                    Number of periods =     10

AR parameter: Common                         Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                      Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t          -7.6601
 Adjusted t*           -4.4336        0.0000

. xtunitroot ht Infc, trend

Harris-Tzavalis unit-root test for Infc
---------------------------------------
Ho: Panels contain unit roots                Number of panels  =     14
Ha: Panels are stationary                    Number of periods =     10

AR parameter: Common                         Asymptotics: N -> Infinity
Panel means:  Included                                    T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                      Statistic           z           p-value
------------------------------------------------------------------------------
 rho                    0.1580        -2.2737          0.0115
------------------------------------------------------------------------------

. xtunitroot ips Infc, demean

Im-Pesaran-Shin unit-root test for Infc
---------------------------------------
Ho: All panels contain unit roots            Number of panels  =     14
Ha: Some panels are stationary               Number of periods =     10

AR parameter: Panel-specific                 Asymptotics: T,N -> Infinity
Panel means:  Included                                        sequentially
Time trend:   Not included                   Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                                Fixed-N exact critical values
                      Statistic      p-value          1%         5%        10%
------------------------------------------------------------------------------
 t-bar                 -2.6601                     -2.140     -1.950     -1.850
 t-tilde-bar           -1.8994
 Z-t-tilde-bar         -3.2419        0.0006
------------------------------------------------------------------------------

. xtunitroot fisher Infc, pperron lags(1)

Fisher-type unit-root test for Infc
Based on Phillips-Perron tests
-----------------------------------
Ho: All panels contain unit roots            Number of panels  =     14
Ha: At least one panel is stationary         Number of periods =     10

AR parameter:     Panel-specific             Asymptotics: T -> Infinity
Panel means:      Included
Time trend:       Not included
Newey-West lags:  1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P        31.5366       0.2938
 Inverse normal            Z        -1.2578       0.1042
 Inverse logit t(74)       L*       -1.1866       0.1196
 Modified inv. chi-squared Pm        0.4726       0.3182
```

Exports Volumes (VX)

```
. xtunitroot llc Xc

Levin-Lin-Chu unit-root test for Xc
-----------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -12.6324
 Adjusted t*          -9.3246       0.0000

. xtunitroot ht Xc, trend

Harris-Tzavalis unit-root test for Xc
-------------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N -> Infinity
Panel means:  Included                                     T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                    Statistic           z            p-value
------------------------------------------------------------------------------
 rho                  -0.2196       -6.2287          0.0000

. xtunitroot ips Xc, demean

Im-Pesaran-Shin unit-root test for Xc
-------------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: Some panels are stationary                Number of periods =     10

AR parameter: Panel-specific                  Asymptotics: T,N -> Infinity
Panel means:  Included                                         sequentially
Time trend:   Not included                    Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                                Fixed-N exact critical values
                    Statistic      p-value          1%         5%        10%
------------------------------------------------------------------------------
 t-bar               -3.1777                      -2.140     -1.950    -1.850
 t-tilde-bar         -2.0317
 Z-t-tilde-bar       -3.9279        0.0000

. xtunitroot fisher Xc, pperron lags(1)

Fisher-type unit-root test for Xc
Based on Phillips-Perron tests
---------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: At least one panel is stationary          Number of periods =     10

AR parameter:   Panel-specific                Asymptotics: T -> Infinity
Panel means:    Included
Time trend:     Not included
Newey-West lags: 1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P       147.9464       0.0000
 Inverse normal            Z        -7.2767       0.0000
 Inverse logit t(74)       L*      -10.5937       0.0000
 Modified inv. chi-squared Pm       16.0285       0.0000
```

Foreign Direct Investment (FDI)

```
. xtunitroot llc FDIc

Levin-Lin-Chu unit-root test for FDIc
-------------------------------------
Ho: Panels contain unit roots             Number of panels  =     14
Ha: Panels are stationary                 Number of periods =     10

AR parameter: Common                      Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                    Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t        -15.5402
 Adjusted t*         -12.2040       0.0000
------------------------------------------------------------------------------


. xtunitroot ht FDIc, trend

Harris-Tzavalis unit-root test for FDIc
---------------------------------------
Ho: Panels contain unit roots             Number of panels  =     14
Ha: Panels are stationary                 Number of periods =     10

AR parameter: Common                      Asymptotics: N -> Infinity
Panel means:  Included                                 T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                    Statistic           z          p-value
------------------------------------------------------------------------------
 rho                 -0.2534        -6.5832        0.0000


. xtunitroot ips FDIc, demean

Im-Pesaran-Shin unit-root test for FDIc
---------------------------------------
Ho: All panels contain unit roots         Number of panels  =     14
Ha: Some panels are stationary            Number of periods =     10

AR parameter: Panel-specific              Asymptotics: T,N -> Infinity
Panel means:  Included                                   sequentially
Time trend:   Not included                Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                    Statistic      p-value          1%         5%        10%
------------------------------------------------------------------------------
 t-bar               -3.0849                     -2.140     -1.950     -1.850
 t-tilde-bar         -2.1270
 Z-t-tilde-bar       -4.4215        0.0000


. xtunitroot fisher FDIc, pperron lags(1)

Fisher-type unit-root test for FDIc
Based on Phillips-Perron tests
-----------------------------------
Ho: All panels contain unit roots         Number of panels  =     14
Ha: At least one panel is stationary      Number of periods =     10

AR parameter:   Panel-specific            Asymptotics: T -> Infinity
Panel means:    Included
Time trend:     Not included
Newey-West lags: 1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P       194.4343       0.0000
 Inverse normal            Z       -10.5017       0.0000
 Inverse logit t(74)       L*      -14.2986       0.0000
 Modified inv. chi-squared Pm       22.2407       0.0000
```

Private Sector Credit Ratio (DC)

```
. xtunitroot llc dcbc

Levin-Lin-Chu unit-root test for dcbc
-------------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                   Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t       -12.7547
 Adjusted t*         -8.7020        0.0000


. xtunitroot ht dcbc, trend

Harris-Tzavalis unit-root test for dcbc
---------------------------------------
Ho: Panels contain unit roots                 Number of panels  =     14
Ha: Panels are stationary                     Number of periods =     10

AR parameter: Common                          Asymptotics: N -> Infinity
Panel means:  Included                                     T Fixed
Time trend:   Included
------------------------------------------------------------------------------
                   Statistic           z            p-value
------------------------------------------------------------------------------
 rho                -0.1339         -5.3311          0.0000


. xtunitroot ips dcbc, demean

Im-Pesaran-Shin unit-root test for dcbc
---------------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: Some panels are stationary                Number of periods =     10

AR parameter: Panel-specific                  Asymptotics: T,N -> Infinity
Panel means:  Included                                     sequentially
Time trend:   Not included                    Cross-sectional means removed

ADF regressions: No lags included
------------------------------------------------------------------------------
                                              Fixed-N exact critical values
                   Statistic      p-value        1%         5%        10%
------------------------------------------------------------------------------
 t-bar              -2.7698                    -2.140     -1.950     -1.850
 t-tilde-bar        -1.9843
 Z-t-tilde-bar      -3.6822        0.0001
------------------------------------------------------------------------------

. xtunitroot fisher dcbc, pperron lags(1)

Fisher-type unit-root test for dcbc
Based on Phillips-Perron tests
-----------------------------------
Ho: All panels contain unit roots             Number of panels  =     14
Ha: At least one panel is stationary          Number of periods =     10

AR parameter:    Panel-specific               Asymptotics: T -> Infinity
Panel means:     Included
Time trend:      Not included
Newey-West lags: 1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P       109.8363       0.0000
 Inverse normal            Z        -6.4532       0.0000
 Inverse logit t(74)       L*       -7.8009       0.0000
 Modified inv. chi-squared Pm       10.9358       0.0000
------------------------------------------------------------------------------
 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

Broad Money radio (MS)

```
Fisher-type unit-root test for MSc
Based on Phillips-Perron tests
------------------------------------------
Ho: All panels contain unit roots            Number of panels       =     14
Ha: At least one panel is stationary         Avg. number of periods =   9.93

AR parameter:     Panel-specific             Asymptotics: T -> Infinity
Panel means:      Included
Time trend:       Not included
Newey-West lags:  1 lag
------------------------------------------------------------------------------
                                  Statistic      p-value
------------------------------------------------------------------------------
 Inverse chi-squared(28)   P       120.1402       0.0000
 Inverse normal            Z        -7.3299       0.0000
 Inverse logit t(74)       L*       -8.7186       0.0000
 Modified inv. chi-squared Pm       12.3128       0.0000
------------------------------------------------------------------------------
 P statistic requires number of panels to be finite.
 Other statistics are suitable for finite or infinite number of panels.
------------------------------------------------------------------------------
```

Appendix 6: Fixed and Random Effect Models

```
. xtreg GDPc dcbc MSc Xc GGDc Infc FDIc, fe

Fixed-effects (within) regression               Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.4313                         Obs per group: min =         9
       between = 0.0978                                        avg =       9.9
       overall = 0.2467                                        max =        10

                                                F(6,119)           =     15.04
corr(u_i, Xb)  = -0.1736                        Prob > F           =    0.0000

------------------------------------------------------------------------------
        GDPc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |   .0577134   .0191413     3.02   0.003     .0198118    .0956151
         MSc |  -.0706929   .0230372    -3.07   0.003    -.1163089   -.0250769
          Xc |   .0763238   .0189352     4.03   0.000     .0388303    .1138173
        GGDc |  -.0559038   .0096344    -5.80   0.000    -.0749808   -.0368268
        Infc |  -.1479633   .0489932    -3.02   0.003    -.2449747   -.0509518
        FDIc |   .0001824   .0004483     0.41   0.685    -.0007054    .0010702
       _cons |   5.961906   .5155857    11.56   0.000     4.940995    6.982817
-------------+----------------------------------------------------------------
     sigma_u |  2.1261415
     sigma_e |  2.5012919
         rho |  .41945843   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(13, 119) =     5.33             Prob > F = 0.0000
```

```
. xtreg GDPc dcbc MSc Xc GGDc Infc FDIc, re

Random-effects GLS regression                   Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.4130                         Obs per group: min =         9
       between = 0.0101                                        avg =       9.9
       overall = 0.3023                                        max =        10

                                                Wald chi2(6)       =     74.85
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
        GDPc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |   .0748365   .0194313     3.85   0.000      .036752    .1129211
         MSc |  -.0618615   .0242789    -2.55   0.011    -.1094473   -.0142758
          Xc |   .0909648   .0196144     4.64   0.000     .0525213    .1294084
        GGDc |  -.0462725   .0100123    -4.62   0.000    -.0658962   -.0266488
        Infc |  -.0731303   .0488397    -1.50   0.134    -.1688544    .0225938
        FDIc |   .0002607   .0004718     0.55   0.580    -.0006639    .0011854
       _cons |    5.09088   .5835857     8.72   0.000     3.947073    6.234687
-------------+----------------------------------------------------------------
     sigma_u |  .99102816
     sigma_e |  2.5012919
         rho |  .13568053   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
        dcbc |    .0577134     .0748365       -.0171231               .
         MSc |   -.0706929    -.0618615       -.0088314               .
          Xc |    .0763238     .0909648        -.014641               .
        GGDc |   -.0559038    -.0462725       -.0096313               .
        Infc |   -.1479633    -.0731303       -.0748329        .0038751
        FDIc |    .0001824     .0002607       -.0000783               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       37.59
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

```
. xtreg dcbc GDPc MSc Xc GGDc Infc FDIc, fe

Fixed-effects (within) regression               Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.3353                         Obs per group: min =         9
       between = 0.6915                                        avg =       9.9
       overall = 0.4103                                        max =        10

                                                F(6,119)           =     10.00
corr(u_i, Xb)  = 0.2182                         Prob > F           =    0.0000
```

dcbc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPc	1.229751	.4078596	3.02	0.003	.4221478	2.037353
MSc	.6047186	.0955523	6.33	0.000	.4155156	.7939217
Xc	-.2355472	.0906453	-2.60	0.011	-.4150339	-.0560605
GGDc	.0078669	.0503676	0.16	0.876	-.091866	.1075997
Infc	-.0697263	.2345747	-0.30	0.767	-.5342077	.3947551
FDIc	.0032102	.00205	1.57	0.120	-.000849	.0072693
_cons	.9104058	3.467241	0.26	0.793	-5.955078	7.77589
sigma_u	4.869442					
sigma_e	11.546075					
rho	.15100601	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(13, 119) =     1.60             Prob > F = 0.0949
```

```
. xtreg dcbc GDPc MSc Xc GGDc Infc FDIc, re

Random-effects GLS regression                   Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.3333                         Obs per group: min =         9
       between = 0.7055                                        avg =       9.9
       overall = 0.4141                                        max =        10

                                                Wald chi2(6)       =     84.76
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

dcbc	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
GDPc	1.390577	.3355932	4.14	0.000	.7328267	2.048328
MSc	.6767238	.0886263	7.64	0.000	.5030193	.8504282
Xc	-.2248258	.0884924	-2.54	0.011	-.3982676	-.0513839
GGDc	.0189156	.045197	0.42	0.676	-.069669	.1075002
Infc	-.0412755	.2040241	-0.20	0.840	-.4411553	.3586043
FDIc	.0026516	.0020178	1.31	0.189	-.0013031	.0066064
_cons	-.5390105	2.778159	-0.19	0.846	-5.984103	4.906082
sigma_u	2.5955123					
sigma_e	11.546075					
rho	.04810249	(fraction of variance due to u_i)				

```
. hausman fixed random
```

	— Coefficients — (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
MSc	.6047186	.6767238	-.0720052	.0357157
GDPc	1.229751	1.390577	-.1608267	.2317902
Xc	-.2355472	-.2248258	-.0107214	.0196383
GGDc	.0078669	.0189156	-.0110487	.0222289
Infc	-.0697263	-.0412755	-.0284508	.1157562
FDIc	.0032102	.0026516	.0005585	.0003621

```
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        8.37
                Prob>chi2 =      0.2123
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        dcbc[country1,t] = Xb + u[country1] + e[country1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    dcbc |   230.5707       15.18455
                       e |   133.3119       11.54608
                       u |   6.736684       2.595512

        Test:   Var(u) = 0
                             chibar2(01) =     1.10
                          Prob > chibar2 =   0.1475
```

```
. reg dcbc MSc GDPc Xc GGDc Infc FDIc

      Source |       SS       df       MS              Number of obs =     139
-------------+------------------------------           F(  6,   132) =   15.57
       Model |  13184.9805     6  2197.49675           Prob > F      =  0.0000
    Residual |  18633.7735   132  141.164951           R-squared     =  0.4144
-------------+------------------------------           Adj R-squared =  0.3878
       Total |   31818.754   138  230.570681           Root MSE      =  11.881

------------------------------------------------------------------------------
        dcbc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         MSc |   .7031976   .0883177     7.96   0.000     .5284964    .8778988
        GDPc |   1.419373     .32332     4.39   0.000     .7798139    2.058932
          Xc |  -.2194381   .0894612    -2.45   0.015    -.3964012   -.0424749
        GGDc |   .0195393   .0448426     0.44   0.664    -.0691638    .1082425
        Infc |   -.049279   .2000533    -0.25   0.806    -.4450042    .3464462
        FDIc |   .0024123   .0020481     1.18   0.241    -.0016391    .0064637
       _cons |  -.7809135   2.536879    -0.31   0.759    -5.799111    4.237284
------------------------------------------------------------------------------
```

```
. xtreg MSc dcbc GDPc Xc GGDc Infc FDIc, fe

Fixed-effects (within) regression               Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.2983                         Obs per group: min =         9
       between = 0.3319                                        avg =       9.9
       overall = 0.3036                                        max =        10

                                                F(6,119)           =      8.43
corr(u_i, Xb)  = -0.0264                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         MSc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |   .4164204   .0657991     6.33   0.000     .2861317    .5467091
        GDPc |  -1.037277    .338025    -3.07   0.003      -1.7066   -.3679536
          Xc |     .08241    .076955     1.07   0.286    -.0699685    .2347885
        GGDc |   -.031088   .0417036    -0.75   0.457    -.1136653    .0514893
        Infc |  -.3527012   .1920266    -1.84   0.069    -.7329331    .0275306
        FDIc |  -.0012652   .0017147    -0.74   0.462    -.0046604      .00213
       _cons |   8.887254    2.76034     3.22   0.002     3.421504      14.353
-------------+----------------------------------------------------------------
     sigma_u |  3.9295065
     sigma_e |  9.5812844
         rho |  .14398293   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(13, 119) =     1.09             Prob > F = 0.3735

. xtreg MSc dcbc GDPc Xc GGDc Infc FDIc, re

Random-effects GLS regression                   Number of obs      =       139
Group variable: country1                        Number of groups   =        14

R-sq:  within  = 0.2786                         Obs per group: min =         9
       between = 0.6983                                        avg =       9.9
       overall = 0.3409                                        max =        10

                                                Wald chi2(6)       =     68.27
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         MSc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |   .4613886   .0579479     7.96   0.000     .3478128    .5749643
        GDPc |  -.5459094   .2763066    -1.98   0.048     -1.08746   -.0043583
          Xc |   .0701392   .0738464     0.95   0.342    -.0745971    .2148755
        GGDc |    .021855   .0362996     0.60   0.547     -.049291     .093001
        Infc |  -.1444287   .1615958    -0.89   0.371    -.4611506    .1722933
        FDIc |  -.0013394   .0016636    -0.81   0.421       -.0046    .0019213
       _cons |   4.220811   2.022561     2.09   0.037      .256664    8.184959
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  9.5812844
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
        dcbc |    .4164204     .4613886       -.0449681        .0311699
        GDPc |   -1.037277    -.5459094       -.4913675        .1947192
          Xc |      .08241     .0701392        .0122708        .0216512
        GGDc |    -.031088      .021855        -.052943        .0205311
        Infc |   -.3527012    -.1444287       -.2082726        .1037353
        FDIc |   -.0012652    -.0013394        .0000742        .0004151
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        7.82
                Prob>chi2 =      0.2516
```

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        MSc[country1,t] = Xb + u[country1] + e[country1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     MSc |   134.4189       11.59392
                       e |   91.80101       9.581284
                       u |          0              0

        Test:   Var(u) = 0
                             chibar2(01) =     0.00
                          Prob > chibar2 =   1.0000
```

```
. reg MSc dcbc GDPc Xc GGDc Infc FDIc

      Source |       SS       df       MS              Number of obs =     139
-------------+------------------------------           F(  6,   132) =   11.38
       Model |  6323.64058     6  1053.9401            Prob > F      =  0.0000
    Residual |  12226.1647   132  92.6224601           R-squared     =  0.3409
-------------+------------------------------           Adj R-squared =  0.3109
       Total |  18549.8053   138  134.418879           Root MSE      =  9.6241

------------------------------------------------------------------------------
         MSc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |   .4613886   .0579479     7.96   0.000      .346762    .5760151
        GDPc |  -.5459094   .2763066    -1.98   0.050    -1.092471    .0006524
          Xc |   .0701392   .0738464     0.95   0.344    -.0759363    .2162147
        GGDc |    .021855   .0362996     0.60   0.548    -.0499493    .0936593
        Infc |  -.1444287   .1615958    -0.89   0.373    -.4640812    .1752238
        FDIc |  -.0013394   .0016636    -0.81   0.422    -.0046302    .0019515
       _cons |   4.220811   2.022561     2.09   0.039     .2199851    8.221637
------------------------------------------------------------------------------
```

Appendix 7: System GMM Results

```
. xtabond2 GDPc L(1/2).(GDPc dcbc) year, gmmstyle(L.(GDPc dcbc)) ivstyle(year, equation(level)) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country1                        Number of obs      =       112
Time variable : year                            Number of groups   =        14
Number of instruments = 84                      Obs per group: min =         8
Wald chi2(5)    =     29.51                                    avg =      8.00
Prob > chi2     =     0.000                                    max =         8
------------------------------------------------------------------------------
             |              Robust
        GDPc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        GDPc |
         L1. |   .2852211   .1225359     2.33   0.020     .0450552    .5253871
         L2. |  -.0565417   .0707561    -0.80   0.424    -.1952212    .0821377
             |
        dcbc |
         L1. |    .026723   .0139119     1.92   0.055    -.0005438    .0539898
         L2. |   .0135456   .0130302     1.04   0.299    -.0119931    .0390842
             |
        year |   .0243192   .1031975     0.24   0.814    -.1779441    .2265825
       _cons |  -45.89661   207.5892    -0.22   0.825     -452.764    360.9707
------------------------------------------------------------------------------
Instruments for first differences equation
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/9).(L.GDPc L.dcbc)
Instruments for levels equation
  Standard
    year

    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.(L.GDPc L.dcbc)
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.09  Pr > z =  0.036
Arellano-Bond test for AR(2) in first differences: z =   1.69  Pr > z =  0.090
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(78)    =  73.14  Prob > chi2 =  0.635
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(78)    =   5.67  Prob > chi2 =  1.000
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(64)    =   5.68  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(14)    =  -0.01  Prob > chi2 =  1.000
  iv(year, eq(level))
    Hansen test excluding group:     chi2(77)    =   7.25  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(1)     =  -1.57  Prob > chi2 =  1.000

. test L1.dcbc+L2.dcbc=0

 ( 1)  L.dcbc + L2.dcbc = 0

           chi2(  1) =    4.94
         Prob > chi2 =    0.0262

. test L1.dcbc L2.dcbc

 ( 1)  L.dcbc = 0
 ( 2)  L2.dcbc = 0

           chi2(  2) =    5.21
         Prob > chi2 =    0.0740
```

```
. xtabond2 GDPc L(1/2).(GDPc MSc) year, gmmstyle(L.(GDPc MSc)) ivstyle(year, equation(level)) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country1                        Number of obs      =       112
Time variable : year                            Number of groups   =        14
Number of instruments = 84                      Obs per group: min =         8
Wald chi2(5)  =     87.26                                      avg =      8.00
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |               Robust
        GDPc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        GDPc |
         L1. |    .326718   .1238766     2.64   0.008     .0839243    .5695117
         L2. |  -.0517393   .0706203    -0.73   0.464    -.1901526    .0866739
             |
         MSc |
         L1. |   .0388179   .0243998     1.59   0.112    -.0090048    .0866406
         L2. |   .0048198   .0129873     0.37   0.711    -.0206349    .0302745
             |
        year |   .0191752   .1082506     0.18   0.859    -.1929921    .2313424
       _cons |  -35.61986   217.8873    -0.16   0.870    -462.6711    391.4314
------------------------------------------------------------------------------
Instruments for first differences equation
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/9).(L.GDPc L.MSc)
Instruments for levels equation
  Standard
    year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.(L.GDPc L.MSc)
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.05  Pr > z =  0.040
Arellano-Bond test for AR(2) in first differences: z =   1.28  Pr > z =  0.199
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(78)   =  56.86  Prob > chi2 =  0.966
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(78)   =   9.17  Prob > chi2 =  1.000
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(63)   =   9.36  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(15)   =  -0.20  Prob > chi2 =  1.000
  iv(year, eq(level))
    Hansen test excluding group:     chi2(77)   =   8.82  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(1)    =   0.35  Prob > chi2 =  0.554


. test L1.MSc L2.MSc

 ( 1)  L.MSc = 0
 ( 2)  L2.MSc = 0

           chi2(  2) =    2.57
         Prob > chi2 =    0.2773


. test L1.MSc+L2.MSc=0

 ( 1)  L.MSc + L2.MSc = 0

           chi2(  1) =    1.94
         Prob > chi2 =    0.1636
```

```
. xtabond2 dcbc L.dcbc L2.dcbc L(1/2).(GDPc) year, gmmstyle(L.(GDPc dcbc)) ivstyle(year, equation(level)) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country1                        Number of obs      =       112
Time variable : year                            Number of groups   =        14
Number of instruments = 84                      Obs per group: min =         8
Wald chi2(5)  =     98.63                                      avg =      8.00
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |               Robust
        dcbc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        dcbc |
         L1. |   .1540534   .1886275     0.82   0.414    -.2156496    .5237565
         L2. |   .0788805   .0813775     0.97   0.332    -.0806164    .2383775
             |
        GDPc |
         L1. |   1.168832   .3724376     3.14   0.002     .4388674    1.898796
         L2. |    .174857   .6292703     0.28   0.781     -1.05849    1.408204
             |
        year |  -.3708702   .5153988    -0.72   0.472    -1.381033    .6392928
       _cons |   745.3194   1036.619     0.72   0.472    -1286.416    2777.055
------------------------------------------------------------------------------
Instruments for first differences equation
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/9).(L.GDPc L.dcbc)
Instruments for levels equation
  Standard
    year

    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.(L.GDPc L.dcbc)
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.39  Pr > z =  0.017
Arellano-Bond test for AR(2) in first differences: z =  -0.30  Pr > z =  0.767
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(78)    =  71.63  Prob > chi2 =  0.681
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(78)    =   8.42  Prob > chi2 =  1.000
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(64)    =   8.37  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(14)    =   0.05  Prob > chi2 =  1.000
  iv(year, eq(level))
    Hansen test excluding group:     chi2(77)    =   7.97  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(1)     =   0.45  Prob > chi2 =  0.502


. test L1.GDPc L2.GDPc

 ( 1)  L.GDPc = 0
 ( 2)  L2.GDPc = 0

           chi2(  2) =   10.80
         Prob > chi2 =    0.0045

. test L1.GDPc+L2.GDPc=0

 ( 1)  L.GDPc + L2.GDPc = 0

           chi2(  1) =    4.16
         Prob > chi2 =    0.0414
```

```
. xtabond2 MSc L.MSc L2.MSc L(1/2).(GDPc) year, gmmstyle(L.(GDPc MSc)) ivstyle(year, equation(level)) robust
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Number of instruments may be large relative to number of observations.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate robust weighting matrix for Hansen test.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, one-step system GMM
------------------------------------------------------------------------------
Group variable: country1                        Number of obs      =       111
Time variable : year                            Number of groups   =        14
Number of instruments = 83                      Obs per group: min =         7
Wald chi2(5)  =     37.87                                      avg =      7.93
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |               Robust
         MSc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         MSc |
         L1. |   .0406116    .073726     0.55   0.582    -.1038886    .1851119
         L2. |   .0002619   .0526094     0.00   0.996    -.1028505    .1033744
             |
        GDPc |
         L1. |   .6810414   .3109183     2.19   0.028     .0716528     1.29043
         L2. |   .7116318    .514114     1.38   0.166     -.296013    1.719277
             |
        year |   .0552475   .4962625     0.11   0.911    -.9174091    1.027904
       _cons |  -114.0906   998.9232    -0.11   0.909    -2071.944    1843.763
------------------------------------------------------------------------------
Instruments for first differences equation
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/9).(L.GDPc L.MSc)
Instruments for levels equation
  Standard
    year

    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.(L.GDPc L.MSc)
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.28  Pr > z =  0.022
Arellano-Bond test for AR(2) in first differences: z =   0.25  Pr > z =  0.800
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(77)    =  65.00  Prob > chi2 =  0.833
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(77)    =  10.16  Prob > chi2 =  1.000
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(62)    =   9.21  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(15)    =   0.95  Prob > chi2 =  1.000
  iv(year, eq(level))
    Hansen test excluding group:     chi2(76)    =  10.04  Prob > chi2 =  1.000
    Difference (null H = exogenous): chi2(1)     =   0.12  Prob > chi2 =  0.729


. test L1.GDPc L2.GDPc

 ( 1)  L.GDPc = 0
 ( 2)  L2.GDPc = 0

           chi2(  2) =    7.73
         Prob > chi2 =    0.0210

. test L1.GDPc+L2.GDPc=0

 ( 1)  L.GDPc + L2.GDPc = 0

           chi2(  1) =    6.14
         Prob > chi2 =    0.0132
```