FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

EXAMINING EXPORTS' CONTRIBUTION TO ECONOMIC GROWTH IN SOUTHERN AFRICA: A PANEL DATA ANALYSIS (2005-2016)

BY

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This dissertation is submitted to the department of Economics in partial fulfilment of

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SUPERVISOR'S APPROVAL FORM

The undersigned certify that they have supervised Itayi Mapfumo's dissertation entitled: **Examining Exports' contribution to Economic growth in Southern Africa: A Panel Data Analysis (2005-2016)**, submitted in partial fulfilment of the requirements for the Bachelor of Commerce Economics Honours Degree at Midlands State University.

SIGNATURE

CHAPTER ONE …….

CHAPTER TWO …….

CHAPTER THREE……...

CHAPTER FOUR …….

CHAPTER FIVE ……...

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APPROVAL FORM

The undersigned certify that the student has been supervised and recommended for acceptance in a research project entitled: **Examining Exports' contribution to Economic growth in Southern Africa: A Panel Data Analysis (2005-2016)**, submitted by Itayi Mapfumo in partial fulfilment of the requirements for the Bachelor of Commerce Economics Honours Degree at Midlands State University.

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DECLARATION

I, Itayi Mapfumo, do hereby declare that this research represents my own work, that is has never been previously submitted for any degree or to any other university.

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Signature of Student Date

DISCLAIMER

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

DEDICATION

The piece of work is dedicated to my aunty, Ms Joyce Gavaza. Her vision steered this wonderful journey through thick and thin and her words of encouragement always gave me power to stay vigilant during the course of this study.

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ABSTRACT

Despite other contributions made to economic growth by other variables such as real growth in services and population growth, there has been an unending debate between exports' contribution to economic growth in the Southern African Development Community (SADC). The purpose of this study was to examine the contribution of exports to economic growth in Southern African Countries for the period 2005 to 2016. A Random Effects Panel Data Model (REM) was used as the estimation technique and the Pedroni Residual Cointegration Test was used to test for the long-run relationship between exports and economic growth in SADC. The results from REM indicated that exports played pivotal role in influencing economic growth for the Southern African Development Community countries during the period under study. Variables such population growth and real growth in manufacturing proved to have a positive contribution to economic growth. Foreign direct investment proved to be statistically insignificant in this study. The cointegration test results show that there existed long run relationship between exports and economic growth. This study concluded that exports were a driver of economic growth in the SADC region for the period under study. It was recommended that countries such as Angola, Botswana, DRC, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe would focus on polices and free trade agreements with countries which are in the European Union (EU) and the Asian Pacific Economic Cooperation (APEC) with the aim to boost economic growth and improving international relations. More so, the extension of the Customs and Trade Facilitation was also recommended to allow easier exportation of goods and services to developed countries for countries which are landlocked in the Southern African.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES PAGE

LIST OF ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
DLS	Dynamic Ordinary Least Squares
DRC	Democratic Republic of Congo
EXPO	Exports
FDI	Foreign Direct Investment
FEM	Fixed Effects Model
FMOL	Fully Modified Ordinary Least Squares
GDI	Gross Domestic Investment
GDP	Gross Domestic Product
INF	Inflation
IMF	International Monetary Fund
LM	Lagrange Multiplier
PCSE	Panel Corrected Standard Errors
PG	Population Growth
PP	Phillips Peron
RBZ	Reserve Bank of Zimbabwe
REM	Random Effects Model
RGDP	Real Growth Domestic Product
RGMAN	Real Growth in Manufacturing
OLS	Ordinary Least Squares
SADC	Southern African Development Community
WB	World Bank

CHAPTER ONE

INTRODUCTION

1.0 Introduction

There are two extreme views of trying to analyse the contribution of exports to economic growth in economies. The first view asserts that, exports contribute positively to economic growth in economies and however, the second view proclaims a negative contribution of exports to economic growth (Chemede, 2001). Exports are a pivotal driver in the growth process of any economy and therefore capable of generating limited foreign exchange reserves in a bid to finance imports of goods such as energy and investment of goods. Exports are important for easing balance of payments in an economy (Jordaan & Eita, 2007). The purpose of this study is to assess the contribution of exports to economic growth in Southern Africa focusing on thirteen countries which include: Zimbabwe, Angola, Mauritius, Democratic Republic of Congo (DRC), Botswana, Lesotho, Madagascar, Malawi, Tanzania, Mozambique, Namibia, South Africa, and Zambia. This chapter intends to begin with the background of the study, statement of the problem, objectives of the study, research questions, research hypothesis and assumptions of the study. It will further advance in giving the significance/justification of the study, study limitations, and study delimitations and definition of abbreviations.

1.1 Background of the Study

Panel datasets are becoming widely used with many individuals and many time periods. A very common case is the availability of cross-country data over a period of time. Econometrics in panel data is shifting to macro panel, with both N and T are large from micro panel, with large N and small T (Lopez and Weber, 2017). The Southern African Development Community (SADC) is a Regional Economic Community comprising of 15 Member States which include: Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. SADC was established in 1992 with the vision of regional integration and poverty eradication within Southern Africa through economic development and ensuring peace and security (SADC, 2018).

Main intra SADC trade export items include petroleum oils, agricultural products, electricity and some clothing and textile products. Main export items to the rest of the world consist of predominantly export of resources (e.g. coal, ferrochromium, manganese ores, platinum, as

well as precious metals and diamonds), resources intensive manufactured goods, mainly for the automotive industry, some clothing and textiles, and tobacco: (SADC, 2018). Table 1.1 show the destinations on exports from the SADC region for the period 2000 to 2010.

Table 1.1 Overall Exports in SADC (2000 -2010)

Regional Economic Community/Continent	**Asian Pacific Economic Cooperation (APEC)**	**European Union (EU)**	**Rest of World**	**Intra (SADC)**	**Rest of Africa**
% Export	45	27	15	10	3

Sources: SADC, International Monetary Fund (IMF), and World Bank (WB) 2016

SADC (2018) asserted that exports of SADC countries are mainly concerted on destinations of Europe and other high-income markets. The table above show that 45% from SADC go to Asia and 27% to Europe for the period between 2000 and 2010. However, only 3% of exports are driven to other African countries. Exports of non-agricultural products to Brazil, Russia, India and China have increased for the period between 2005-2010. Most of the SADC member countries are very far from America, Asia, and Europe and hence also far from major shipping routes. The economic structures of SADC countries are heterogeneous, and they fall broadly into main groups which include agricultural based economies and mineral based economies. Mozambique, Malawi and Tanzania have their economies driven by the agricultural sector, more so, Mauritius had an agricultural sector driven economy but as a result of some structural adjustments in the early 1980s, the economy is now nurtured through export-led industrialisation, agricultural diversification and expansion of the tourist industry (Yabu, n.d.).

The mining sector continues to be one of the vital sectors for countries such as Botswana and Angola. The global share of exports in goods and services have been crippled in most of the regional communities in Africa but however SADC has been contributing much in exports compared to other regions. However, total exports of goods and services have been low in SADC (Sophie and Guillaume, 2002). The following figure shows the exports as a percentage of GDP and GDP growth for selected countries in the SADC region:

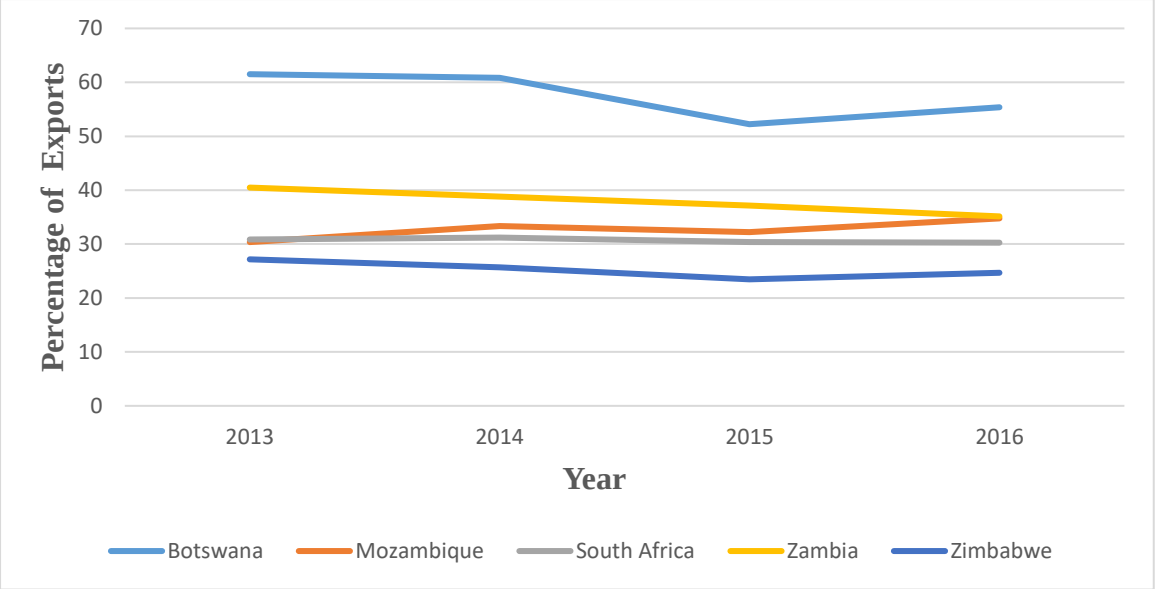

Figure 1.1 Trends of Exports to GDP for Selected Countries 2013-2016

Source: World Bank (WB), Southern African Development Community (SADC), (2016)

The following graph shows the trends in economic growth rates for the selected countries from 2013-2016.

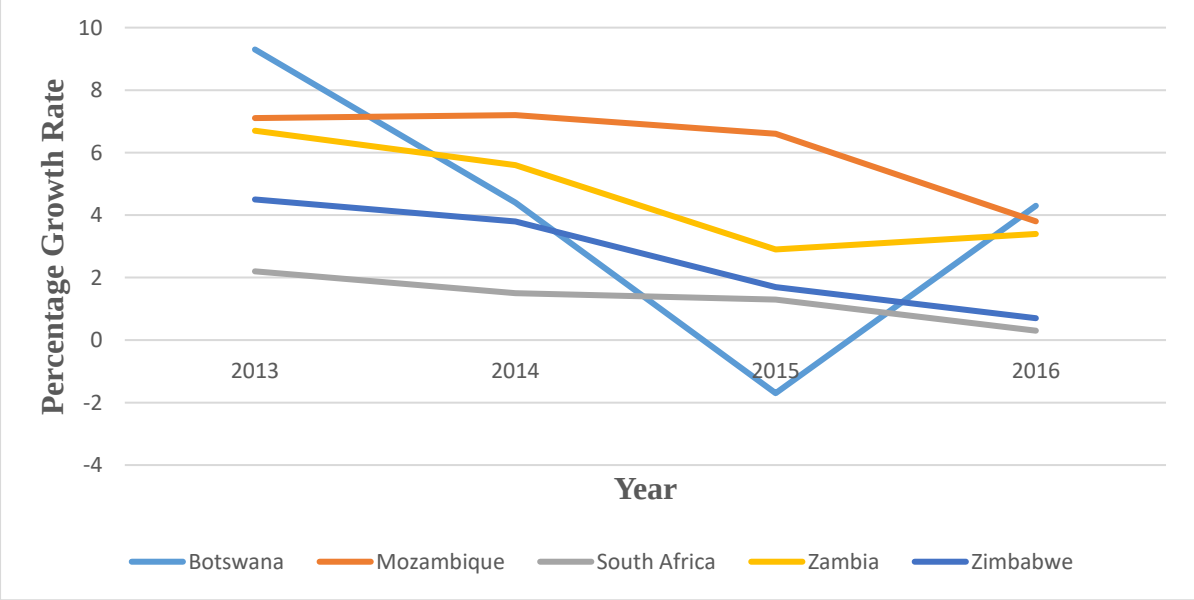

Figure 1.2 Trends of Economic Growth Rates for Selected Countries 2013-2016

Source: World Bank (WB), Southern African Development Community (SADC), (2016)

Botswana is an export driven economy and the economy is highly correlated with the global trends. As a result of the 2007 global financial crisis, the economy of Botswana faced a negative growth rate but however, in 2013 and 2014 there was a recovery in the economy. In

2015, there was a decline in the economy which was propagated by a decrease in the global diamond demand. The trade balance of Botswana is largely tied on the global demand for exports which represent approximately about 85% of the export revenue and has been contributing an average of 3.5% exports in the world for the period under study (International Trade Centre, 2016).

International Trade Centre (2016) availed that Mozambique experienced waves of political turmoil between 2013 and 2016. GDP slowed down in 2015 as the economy adjusted to lower world commodity price and decrease inflows of Foreign Direct Investment (FDI). Real GDP decrease in 2016 was as a result of falling export revenues and rising import costs. Mozambique's main export destinations include: Netherlands, South Africa, Portugal, Spain and China. On average, Mozambique contributed 2% of the world exports during the period under study.

According to SADC (2018), South Africa is on position thirty-three as the largest export economy in the world. In 2016, South Africa exported USD 8941million and on average it contributes to least 50% of the world exports for the period between 2009 and 2016. In 2013, 2014 and 2015, a decrease in export contribution to economic growth was experienced as a result of a decrease in exports to China as one of its major export destination. Zurcom International (2014) reported that China projected a GDP growth of 7.5% in 2014 which was 0.2% lesser than the 2013 GDP of 7.7%. China being the second largest economy in the world, the drastic slow-down in economic activity affected trade between China and South Africa.

Zambia exports have been decreasing since 2013 being propelled by a decrease in commodity prices, particularly the copper prices. Copper is one of the major contributor to export revenue in the Zambian economy. In 2016, economic crisis was experienced due crippling electricity supply and decrease in copper prices. On the other hand, a decrease in economic growth was experienced between the period 2013 and 2016 (Chirwa *et al*., 2017).

In 2013, Zimbabwe held the general elections and due to uncertainty in the outcome of the political environment most investors stopped investing in the economy and they have caused a decrease in exports during the period mentioned. In 2016, shortages of foreign currency were heavily experienced in the economy and therefore the government introduced bond notes to curb the cash crisis but however, decreases in economic growth were experienced. In

the same year, the nation received high rainfall which may have increased the percentage of exports contribution to economic growth from 23,46% in 2015 to 24.66% in 2016.

1.2 Statement of the Problem

As shown in the background, there has been a decrease in economic growth on average for the period between 2013 and 2016, thus the researcher is motivated to identify the contribution of exports to economic growth. The purpose of this study is to empirically examine the influence of exports to growth in the economy using a panel of thirteen countries in Southern African Development Community (SADC).

1.3 Study Objectives

- To empirically determine the contribution of exports to economic growth in SADC
- To identify other variables that affect economic growth in SADC
- To investigate if there is cointegration between exports and economic growth

1.4 Research Questions

- Do exports contribute to economic growth?
- Are there any other variables that influence economic growth?
- Is there cointegration between exports and economic growth?

1.5 Research Hypothesis

Exports do not contribute to economic growth.

1.6 Significance of the Study

The study is likely to be the first to analyse the contribution of exports to economic growth in panel dataset of thirteen countries. Chigusiwa *et al* (2011) examined the validity of exports to growth in Zimbabwe for the period 1977 to 2006 using annual time series data. Bounds test Auto Regressive Distribution Lag (ARDL) approach to cointegration was used to investigate the long-run relationship between exports and non-exports Gross Domestic Product. More so, Bonga *et al* (2015) examined the relationship between GDP and exports using time series data between 1975 and 2013 in Zimbabwe. Granger Causality test, Vector Auto-Regression (VAR), Vector Error Correction (VEC) and Impulse Response Function (IRF) were the estimation methods used in the analysis. The core of this research is to fill a research gap, in application to the Southern African Development Community (SADC) pertaining to the contribution of exports to economic growth. Most studies on exports and economic growth concluded that exports are significant in contributing to economic growth in economies. The

outcome of this research will be beneficial to academic institutions such as Midlands State University (MSU), Southern African Development Community (SADC), governments, policy makers and mining industries in Southern Africa.

1.7 Limitations of the Study

- **Data used in the analysis**- though the Southern African Development Community (SADC) may have collected the data in analysis, various sources may have different figures due to continuous revisions hence difficulties in choosing data sources hence the researcher used data from SADC statistics, IMF and World Bank.

1.8 Delimitations of the Study

The research will consider thirteen countries that are actively involved in exporting from the Southern African Development Community (SADC) and they include: Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. More so, the dataset used is from secondary sources which include World Bank (WB), International Monetary Fund (IMF), Zimbabwe Statistics (ZimStat), Reserve Bank of Zimbabwe (RBZ), Reserve Bank of Zambia and Southern African Development Community (SADC) for the period between 2005 and 2016.

1.9 Organisation of the rest of the Study

The study is organised as follows; chapter two covers literature review while chapter three discusses the methodology of the research study and data issues. Chapter four present results and interpretations of results generated in estimations. Furthermore, chapter five gives the conclusion, policy recommendations and suggested areas of further study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The extensive literature that is linked to exports and economic growth in economies remains a key issue in policy discussions. Theory and empirical literature give some guidelines on the discussion afore mentioned. Most empirical studies support the notion that exports have a positive contribution in economic growth.

2.1 Theoretical Literature Review

Theoretical literature review in this study is centred on examining the corpus of theories and models by various scholars that explain the relationship between exports and economic growth and the relationship between them.

2.1.1 Absolute Advantage Theory

Adam Smith advocated that trade between two countries is based on absolute advantage. When one nation is efficient is more efficient (absolute advantage) in the production of one commodity than the other nation and less efficient in the production (absolute disadvantage) of the other commodity then the two nations can specialize in the production of commodities where they have absolute advantage (Salvatore, 2013). Krugman & Obstfeld (2003) alluded that each nation would then export the commodity that it has absolute advantage and import that it has absolute disadvantage in order to have gains of trade. The process may encourage economic growth since there is efficiency in the production processes thus more goods are produced using less resources which increase output. More so, based on this theory, the research expects to have exports as a contributor to economic growth in this study.

However, the theory did not take into consideration the concept of opportunity cost. Gans, *et al* (2013) gave the notion that opportunity cost is the best alternative gone when choice is made. The view show that by choosing to produce a commodity in which there is absolute advantage, the nation may lose the benefits of producing the other product forgone. Based on this theory a positive relationship between exports and economic growth is expected in the Southern African Development Community (SADC) countries.

2.1.2 The Ricardian Model

David Ricardo propounded the theory of comparative advantage in 1817. The model assumes that there are two countries that use one factor of production, usually labour to produce two

goods. The goods produced are assumed to be homogeneous across all countries and firms hence can be shipped from one country to the other at no transportation costs (Salvatore, 2013). The model highlighted that a country has comparative advantage if the opportunity cost of producing a good is lower in the country compared to other countries. David Ricardo argued that trade between countries would be beneficial if each country exports goods in which it has comparative advantage which means that there is absolute advantage and consideration of opportunity in the production decisions which was a loophole in the theory of absolute advantage that based exporting on efficiency. The conclusion of the model was that exports would lead to improved standards of living through economic growth (Krugman & Obstfeld, 2003). As a nation trades with another, gains in trade are as a result of more exports since there is efficient production which enable to increase output of both commodities at a lower cost. In line with this theory, the study findings are expected to give a positive relationship between exports and economic growth.

2.1.3 Dependency Theory of Growth

The theory was developed in the 1950s by Raul Prebisch and his colleagues after discovering that economic growth in developed countries did not necessitate growth in less developed countries. The neoclassical theorists assumed that economic growth was beneficial to all economies although the benefits could not be shared equally hence the dependency theorists argue against this assumption (Ferraro, 2008). Although David Ricardo and Adam Smith argued that nations can trade goods and services between each other without the nature of the goods, the dependency theory has a different view. The explanation by Raul Prebisch was that poor countries export primary commodities to richer countries and the richer countries use the commodities to manufacture their products which are then sold to poor countries. The exports revenues generated from the primary commodities are less than the value that is paid on the imports since the value addition on the manufactured goods is more than the value of primary goods. As a result, poor countries would never earn enough from the value of their exports. Riding on the arguments raised in this theory, a negative contribution of exports to economic growth in SADC is expected.

2.1.4 The Dual Growth Model

Todaro & Smith (2012) illustrated the dual growth model that was propounded by Lewis in 1954. According to the model, in underdeveloped countries there are two sectors namely the agricultural sector and the modern sector. The agricultural sector is characterised by surplus labour supply, production for consumption and no reproducible capital. Moreover, the

modern sector is characterised by intensive use of capital, hired labour and output sold for profit. The theory highlights that labour is transferable from the agricultural sector to the modern sector without affecting production output in the agricultural sector. As production increases in the modern sector, more output of goods increases and hence more profits are generated. Profits are reinvested in the production of goods through accumulating capital. If the goods produced are exported, an increase production tends to increase the exports thus the model supports the notion that exports have a positive contribution to economic growth (Colman and Young, 1989). According to this theory, the researcher anticipates a positive relationship between the variables running from exports to economic growth.

However, in reality underdeveloped countries have many various sectors which may include the mining sector, manufacturing sector services sector and tourism sector. This view shows that labour can be transferred from the agricultural sector to any of the existing sectors in the economy. More so, the assumption that production in the agricultural sector is the purpose of consumption may not hold since some families are in the production of cash crops such cotton and tobacco.

2.1.5 Export-led Growth Theory

Theoretical argument on export-led growth emerged from the neoclassical theorists who have who witnessed the success of the free market economy (Krugman and Obstfeld, 2003). According to the view of Mankiw (2005), the theoretically, exports expansion could lead to economic growth focusing on both the demand side and the supply side. Policies that promote exports would result in an increase in the total demand which would therefore lead to improvement in the capacity utilization and reduction in unemployment. The supply side effects the economy in two ways where the first one focuses on the supplying of bottlenecks which are as a result of shortages in capital as well as the raw materials in which developing countries import. The second one is when there is diversification of resources from the sectors that do not exports to sectors which export. If the productivity in the exporting sector is high, the economy tends to enjoy economies of scale thus leading to growth. In conclusion, as export sector continues to perform at its very best, economic growth would be guaranteed ceteris paribus.

2.2 Empirical Literature Review

The empirical literature gives a review on studies that have been conducted in the area under research. Studies that have been carried out empirically on the connection between exports

and grow gave different conclusions based on various estimation techniques. Some studies support the notion that exports are a driver of economic growth and however, the latter studies give a negative relationship between exports and economic growth.

Feder (1982) analysed the sources of growth for a group of 55 less developed economies for the period between 1964 and 1973. Annual data was used in the study using the following variables GDP growth rate, share of investment in GDP, the growth rate of population, growth rate of exports and share of exports in GDP. Ordinary Least Squares (OLS) was applied in the study and the findings support the export led growth in the 55 less developed economies. The researcher concluded that growth can not only be necessitated only by increase in labour and capital but however by reallocation of resources already in existence from less efficient non-exporting sector to the sector with high productivity. Findings of the study strongly comply with the Ricardian theory of 1817 by David Ricardo who has the view that two countries would gain from trade if one country exports goods in which it has comparative advantage.

Furthermore, Qarn and Suleiman (2001) studied a paper on the export-led growth hypothesis for 9 Middle East and North America (MENA) countries which include Algeria, Sudan, Egypt, Morocco, Tunisia, Turkey, Iran and Israel using annual data for the period 1968-1996. Variables used include GDP, exports, manufacturing industry exports and imports using Vector Autoregressive and Error correction models in annual data analysis. Taking into account the summation of all exports, the results did not accept the null hypothesis that exports drive growth for almost all the 9 countries thus the findings suggested that exports would initiate economic growth if and only if a convincing edge is reached. The results based on manufacturing exports and economic growth confirmed export-led growth for Algeria and Sudan and however, export-led growth was rejected for Egypt, Morocco, Tunisia, Turkey, Iran and Israel during the period under study. The study concluded that some exports are capable of contributing to growth.

More so, applying Vector Autoregression Model (VAR) and Granger Causality Test as the estimation techniques, Tuncer (2002) investigated the dynamic linkages amongst GDP, exports, imports and investment in Turkey for the period 1980-2000 using quarterly time series data. The variables used in the study include exports, imports, GDP, investment and exchange rate and the findings showed the causality runs from GDP to exports and investment and no causality running from exports to GDP. The conclusion of the research was that no export-led growth was found during the period under study. It is important to

consider that the results of this study are linear with the view of the Dependency theory that was alluded in Ferraro (2008) who argued that exports from developing countries would not encourage economic growth as a result of less export revenue generation amid to exportation of primary commodities.

Alam (2003) examined the export-led growth hypothesis focusing on annual data from 2 Latin countries: Mexico and Brazil for the period between 1955-1990. In this study, 2 cointegrating procedures were used in determining the number of cointegrating vectors and also 3 estimation techniques were used in the estimation of the parameters to identify the long-run relationship. The variables used include GDP, capital stock, employed labour, manufacturing export and capital goods of imports. The findings rejected the contribution of manufacturing exports to economic growth. Conclusion of the study was that import capital goods appeared to be a significant contributor of economic growth in both countries.

Keong *et al.* (2005) empirically analysed the strength of export-led growth in Malaysia using comprehensive estimation techniques for the period between 1960 and 2001. Auto-Regressive Distributed Lag (ARDL), Granger Causality and Vector Autoregressive (VAR) were the estimation techniques applied in the study using time series data on the following variables GDP, exports, imports, exchange rate and labour. The findings proved that there was causality running from exports to economic growth thus it was concluded that exports were a driver of economic growth in Malaysia between 1960 and 2000. The results of this study cement the notion that was alluded in the Absolute advantage theory where exports of goods would determine growth in economies as a of trade.

Furthermore, Cuaresma and Worz (2005) examined the hypothesis that exports in technological intensive industries have a higher potential for positive growth using a panel dataset of 45 developing countries including exports of about 33 countries over the period 1981 to 1997. The variables used in the study were GDP (growth rate), population growth rate, share of investment in GDP, the share of high technology and low technology, manufacturing industry export in GDP and the share of non-manufacturing industry export in GDP. Random Effects Model (REM) and Instrumental Variables were the estimation methods used in the study and however, the findings based on these estimation methods supported the hypothesis of qualitative differences found between high and low technological exports to have an impact on economic growth. The conclusion of the study was that exports drive economic growth between 1981 and 1997 in the panel countries.

Herzer *et al.* (2006) studied the effects of manufacturing exports and primary exports on productivity growth in Chile using time series data for the period between 1960 and 2000. The variables used in the research include GDP, capital stock, labour, capital goods imports, manufactured exports and primary exports. Cointegration: Engel-Granger Method, Johansen Cointegration and Dynamic Ordinary Least Squares were the estimation techniques applied in the study and therefore the findings show that there was both short-run and long-run relationship running from manufacturing exports to economic growth. The conclusion of the study was that exports had an impact on economic growth in Chile over the period under study and however researchers proposed that further studies should be conducted focusing on the relationship between composition of primary and manufactured exports and economic growth prior to policy recommendations.

More so, Hassan (2007) investigated the relationship between exports and economic growth in Saudi Arabia for the period between 1970 and 2005. The research used a variety of variables which include Real Gross Domestic Product (RGDP), Real Private Consumption, Real Government Expenditure, Real Investment, Real Exports and Growth Rate of World GDP. More so, modern econometric techniques were applied such as Vector Auto-Regression (VAR), Impulse Response Function (IRF) and the Granger Causality test were applied to determine the relationship both in the short-run and in the long-run relationship between exports and economic growth in Saudi Arabia. Findings of the study showed a significant effect on economic growth and positive relationship on other variables in the long-run. Hence it was concluded that exports contribute to economic growth in Saudi Arabia.

Although time series studies have support export-led growth, a panel cointegration approach on four countries namely India, Bangladesh, Pakistan and Sri Lanka were applied by Parida and Saboo (2007) in the investigation of export-led and manufacturing export-led growth in South Asia for the period 1980-2002. The variables used in the analysis include GDP, Non-export formation, public health, education expenses, manufacturing imports, manufacturing exports and total exports. The findings of the study depicted that a long run relationship between exports and non-export GDP existed and more so the exports along with other variables in the model supported the notion of export-led growth for the panel countries.

Furthermore, Krishan *et al.* (2008) examined the relationship between economic growth, export instability, economic growth, gross fixed capital formation and export growth in India for the period 1971-2005 in annual time series data. The researchers used GDP, exports, export variability and investment as the estimation variables. Johansen cointegration

technique, Vector error correction model and Granger Causality were the estimation methods and the findings based on the Johansen cointegration test revealed a long run relationship between economic growth and export growth. More so, based on the Granger Causality test, the causality was found to be unidirectional running from real exports to economic growth. The conclusion of the study was exports in India were a driver of economic growth between 1971 to 2005. The findings in this study support the outcome from a study by Keong *et al* (2005) who carried out a study in Malaysia.

More so, Chigusiwa *et al* (2011) analysed the validity of export-led growth hypothesis in Zimbabwe using annual time series data for the period 1977-2006. The researchers used variables such as non-export output, capital stock in real firms, real exports, real imports of capital goods, non-export GDP, capital stock capital imports, primary export goods and manufacturing goods exports. Two models were used in the estimation techniques: the first model being the total export model and the second model being the disaggregated exports into primary goods exports and manufactured exports. The findings of the study support export-led growth hypothesis in Zimbabwe and more so, they revealed a long-run relationship existing exports and non-exports GDP and that the direction of relationships runs from exports to non-exports in short-run period as well in the long-run relationship. In conclusion, the study supported the export-led growth in Zimbabwe as primary exports had a significant contribution to exports and economic growth. More so, the researchers echoed that the Zimbabwean economy strongly on foreign trade and the performance of the international market thus the government make sound macroeconomic policies to foster growth in the long-run. It is important to note that the results in this study complement the findings found by Parida and Saboo (2007) which showed a long-run relationship between exports and non-exports GDP in South Asia.

Furthermore, Biyase and Zwane (2014) conducted a study to analyse the export-led growth hypothesis for 30 African countries for the period 1990-2005. The researchers used 4 panel in this analysis: Ordinary Least Squares (OLS), Fixed Effects Model (FEM), Random Effects Model (REM) and 2 Stage Least Squares (2SLS). More so, the variables used in the study include GDP, Government Expenditure, Gross Domestic Investment (GDI), inflation and labour force. The findings from the models provide some evidence of export led growth in the 30 African countries since a 1% increase in exports resulted in a 10% increase in economic growth. Researchers concluded that exports drive growth during the period under

study and the study is linear to the results of Cuaresma and Worz (2005) who used some of the models in this study to come to the conclusion that exports drive economic growth.

Gokmenonglu *et al.* (2015) carried out a study in Costa Rica to examine the hypothesis that exports drive economic growth using time series data for the period between 1980 and 2013. Granger Causality test and Johansen Cointegration test were the estimation techniques used for the variables real GDP and real exports. The findings from the Johansen Cointegration test show that long-run relationship existed between exports and economic growth and also the results from the Granger Causality test show that a unidirectional relationship existed running from economic growth to exports. The conclusion of the study was that economic growth cause exports growth in Costa Rica during the period under study thus showing the evidence of no export-led growth in the country.

More so, a panel data analysis was carried out on Sub-Saharan Africa (SSA) by Yee-Ee (2015) with the objective of investigating export-led growth for the period 1985 to 2014 and the countries under study were Botswana, Mauritius and Equatorial Guinea. Panel unit root test, Panel Cointegration, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DLS) were the estimation techniques applied in the research and therefore results depicted a positive impact between exports, investment and government expenditure on economic growth. Thus, it was concluded that export-led growth existed in the Sub-Saharan African countries.

Furthermore, Kumar (2015) carried out a research to examine if an outward oriented trade policy is preferable to an inward oriented trade policy in stimulating growth in time series data. In line with this investigation, 2 hypotheses were developed: export-led growth and growth-led export hypothesis. The paper investigated the relationships between economic growth and exports in India for the period between 1980-2009 focusing exports and GDP as variables. The findings of the study suggested a bidirectional relationship between exports and GDP after the application of the Granger Causality estimation technique. The conclusion of the study was that exports drive economic growth in India during the period 1980 to 2009.

Khan *et al.* (2016) evaluated the importance of sectorial exports and its main determinants on economic growth in the economy of Pakistan using annual time series data for the period 1972-2015. Some of the variables used in the research are International Trade, exports of primary commodities, Exports of Textile Manufacturing Sector, Exports of the other goods, World Income, Trade Openness, Terms of Trade and Balance of Trade. The researcher used

various estimation methods which are unit root testing, Auto-Regressive Distribution Lag Model (ARDL), ARDL bounding test, Wald test and ARDL cointegration and however, the results of the study revealed that exports and its determinants were insignificant in fostering economic growth in Pakistan during the period under study. The conclusion of the study was that failure in export growth in Pakistan depended on some socio-economic and political issues. It is of paramount importance to note that the findings in this study strongly agree with the results from Tuncer (2002), Qarn and Suleiman (2001) and Gokmenonglu *et al* (2015).

2.3 Conclusion

The theoretical and empirical literature review in this chapter gave a vivid basis in the positive and negative contribution of exports to economic growth. As evidenced by the empirical studies reviewed in this chapter, most studies were done using time series analysis as compared to panel data analysis and Zimbabwe has not been spared. The study intends to cover this gap by adapting to some of the models in investigating the contribution of exports to economic growth in thirteen selected Southern African countries which include Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe. The next chapter be looking at methodology and justification of variables.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In an effort to analyse the contribution of exports to economic growth, a panel data regression will be used. Panel data syndicates both cross sectional and time series characteristics of data. The researcher came up with the methodology that would be used to examine export's contribution to economic growth based on literature reviewed in chapter two.

3.1 Model Specification

The model to be used in this paper was adapted from (Biyase & Zwane, 2014) in a study that analysed empirically the export-led growth hypothesis for 30 African countries for the period between 1990 and 2005 and from (Cuaresma & Worz, 2005) in a study which investigated the hypothesis that exports in technology intensive industries have a higher potential for growth in a panel data set between 1981 and 1997. The correct model (REM, Pooled or FEM) to be used in the research shall be based on the results of the diagnostic tests.

$$\mathrm{RGDP_{i,t}} = \beta_0 + \beta_1 \mathrm{EXPO_{i,t}} + \beta_2 \mathrm{PG_{i,t}} + \beta_3 \mathrm{FDI_{i,t}} + \beta_4 \mathrm{RGMAN_{i,t}} + \beta_5 \mathrm{INF_{i,t}} + \varepsilon_{i,t}$$

$$i=1,2,\ldots,\mathrm{N} \; : t=1,2\ldots,T$$

$$\varepsilon_{i,t} = \lambda_t + \alpha_i + \mu_{i,t}$$

where i represent country and t represent the time. Real Gross Domestic Product (RGDP) is the measure of national income of an economy after adjusting for inflation. More so, $\mathrm{RGDP}_{i,t}$ is the dependent variable representing real growth rate in country i at time t , $\mathrm{EXPO}_{i,t}$, $\mathrm{PG}_{i,t}$, $\mathrm{FDI}_{i,t}$, $\mathrm{RGMAN}_{i,t}$ and $\mathrm{INF}_{i,t}$ are independent variables in the models which are Exports, Population Growth, Foreign Direct Investment, Real Growth in Manufacturing respectively and Inflation. β_0, β_1, β_2, β_3, β_4 and β_5 are the parameters in the models. The error terms are represented by $\varepsilon_{i,t}$ which is intended to capture the cross sectional effects, time effects and other factors affecting economic growth but not included in the model.

3.2 Justification of Variables

3.2.1 Exports (EXPO)

Salvatore (2013) argued that exports are goods and services in which one country produces for the purpose of selling to another country or other countries. In this study, percentage of exports to gross domestic product is the unit measure for exports. More so, Salvatore *ibid*

echoed that exports would improve economic performance if two nations trade in the theory of comparative advantage by David Ricardo hence exports are an important determinant of economic growth. According to the exports led growth, exports drive growth either on the demand side or on the supply side. The demand side is as a result of the involvement of excess capacity and unemployed labour in an economy. If an economy has policies which support exports, there would be an increase in capacity utilization and reducing unemployment. Furthermore, Krishan (2008) revealed that increase in exports would tend to increase economic growth on the basis of exports having a greater percentage contribution to the economy in a study conducted in India. An increase in exports during the study period resulted in an increase in economic growth. The researcher expects a positive sign based on the results by Krishan (2008).

3.2.2 Population Growth Rate (PG)

Todaro and Smith (2012) defined population growth as the change in the number of people exist in a given city, town or country over a given time period. Population growth rate is the unit used to measure the rate at which population is changing. Theory support the notion that population growth is desirable for economic growth in developing countries, for example Zimbabwe, Botswana, Zambia and Mozambique. Underdevelopment, world resource depletion, and environmental distribution are viewed as the major factors retarding economic growth. However, empirical research has shown that although population growth is not a major obstacle to promote economic stagnation, rapid growth in population tends to lower per capita income growth in most of the developing countries and most hard-hit economies are those which are poor, dependent on agriculture and facing pressures on land natural resources. A positive relationship is expected.

3.2.3 Foreign Direct Investment Inflow (FDI)

Shone (2002) alluded that foreign direct investment is an injection into another country by an investor from another country. In line with this definition, increase in investment in an economy means an injection and hence tends to have a positive impact on economic growth. FDI in this study is measured using percentage of foreign direct investment in gross domestic product. According to Mankiw (2005) foreign direct investment increase would initiate a positive impact on growth in the economies and however a decrease in foreign direct investment without an increase in the domestic investment would result in economic growth decrease. A positive relationship is therefore expected in this study.

3.2.4 Real Growth in Manufacturing (RGMAN)

Clark (1957) highlighted that growth in the manufacturing would in turn lead to growth in the economy since the manufacturing sector is one of the key determinants of economic growth. The larger the percentage growth of manufacturing would have a greater impact on economic growth if the manufacturing sector contributes a greater percentage of Gross Domestic Product (GDP). A positive relationship is expected.

3.2.5 Inflation Rate (INF)

According to Blanchard *et al.* (2010) inflation is the general rise in price levels of a period of time and is measured using annual inflation rate. Inflation has been argued to deter growth in most of the economies, high levels of inflation brings misallocation of resources and reduced incomes which lead to low savings and low savings leading to low investment thus affecting macroeconomic performance negatively Biyase and Zwane (2014). A negative relationship is expected.

3.2.6 Error Term (ε)

According to Gujarati and Porter (2009) the error term (disturbance term) captures other factors not included in the model but have an impact on the dependant variable. Such factors include omitted variables, unavailability of data and measurement errors. Therefore, the error term would capture variances in exports which affect real GDP not included in the model.

3.3.7 Priori Expectations on Variables

The priori expectations on explanatory variables are shown on the table below:

Table 3.1 priori expectations on variables

Variable	Expected Sign	Reasoning
EXPO	Positive	The higher the exports the greater the growth rate of the economy.
PG	Positive	The greater the percentage growth of population the greater the economic growth rate as labour becomes available for production.
FDI	Positive	An increase in investment in an economy would imply an increase in economic growth.

RGMAN	Positive	The higher the real growth in manufacturing, the higher the growth rate of the economy.
INF	Negative	The higher the inflation rate, the lower the rate of economic growth.

3.3 Data Sources

The data used in this study panel data. The data sources are: World Bank (WB), International Monetary Fund (IMF), Zimbabwe Statistics (ZimStat), Reserve Bank of Zimbabwe (RBZ), Reserve Bank of Zambia and Southern African Development Community (SADC). Annual data for the period 2005 to 2016 on balanced panel regression shall be used.

3.4 Diagnostic Tests

There is need to carry out diagnostic tests before estimation cab be done in order to avoid biased results. The test that shall be carried out on raw data which will be discussed below:

3.4.1 Panel Unit Root test

Gujarati and Porter (2009) posits that unit root testing is importance in the diagnosis testing as it helps to reduce the problem of nonsensical regression. In panel data, unit root may be tested after assuming cross section dependency or cross-sectional independence. In this study, the researcher assumes cross sectional independence and therefore the results are based on the p-values of the following tests: Levin, Lin and Chu test; Im, Pesran and Shin W-test; Augmented Dickey Fuller (ADF) Chi-square and Phillips Peron (PP) Chi-square. The hypothesis of the test will be as follows:

H_0: The panel is non-stationary

H_1: The panel is stationary

Decision Rule: Do not reject H_0 if the probability value of the tests is greater than 0.05 and conclude that the data is non-stationary.

3.4.2 Panel Cointegration Test

Cointegration is carried out to ascertain the long-run relationship they exist on variables under study in a regression model. More so, cointegration may carried to identify a connection between variables that are not stationary at the same level: Gujarati and Porter (2009). In this study, the Pedroni Residual Cointegration Test would be used since Baltagi

(2005) alluded that the test allows for cross section heterogeneity. The hypothesis testing would be:

H_0: There is no cointegration

H_1: There is cointegration

Decision Rule: Do not reject H_0 if the probability value is greater than 0.05 and conclude that there is no cointegration.

3.4.3 Hausman Test for Random Effects

An important assumption in REM estimation is that the random effects are uncorrelated with the independent variables. The Hausman test is used as a formal test for this assumption which compares the REM model estimated coefficients and those of the Fixed Effects Model (FEM). The REM and the FEM are asymptotically equivalent if the unobserved effects are exogenous, hence the null hypothesis for the Hausman test is:

H_0: Random-Effects Model (REM) is appropriate

H_1: Fixed-Effects Model (FEM) is appropriate

The rejection of the null hypothesis means REM is inconsistent and FEM is preferred as the correctly specified model. When the null hypothesis is not rejected, then it follows that REM is preferred to FEM (Gujarati & Porter, 2009).

3.4.4 Breusch-Pagan Lagrange Multiplier (LM) test

This is done to test the existence of both individual and time series effects which is important in panel and pooled regressions. Breusch-Pagan (LM) test will be used to test for the presence of cross sectional and time effects on the data in order to choose between the pooled Ordinary Least Squares (OLS) and a Random Effects Model (REM). Two-way error components disturbances are considered as:

$$\mu_{it} = \mu_i + \lambda_t + \upsilon_{it}$$

for cross section $i = 1,\ldots, N$ and periods $t = 1,2,\ldots, T$ where μ_i denotes unobservable individual effects, λ_t show unobservable time effects and υ_{it} is the remainder stochastic disturbance term.

The LM test stem from the independence of the unobserved cross-sectional and time effects, as well as the stochastic disturbances, i.e N (0, σ_{μ}^{2}), N (0, σ_{λ}^{2}) and N (0, σ_{υ}^{2}) respectively. The following null hypotheses are tested:

No individual effects $\boldsymbol{H_0^{\mu}: \sigma_{\mu}^2 = 0}$

No time effects $\boldsymbol{H_0^{\lambda}: \sigma_{\lambda}^2 = 0}$

No individual and time effects $\boldsymbol{H_0^{\mu\lambda}: \sigma_{\mu}^2 = \sigma_{\lambda}^2 = 0}$

Rejection of any of these hypotheses would mean that the Random Effects Model (REM) will be chosen as the model of specification and pooled model will be dropped (Baltagi, 2005).

3.5 Conclusion

The chapter has established the methodology that would be used in the study. The researcher is satisfied with the methodology as it would be able to meet the objectives of the study. The next chapter gives the results and interpretation of the study findings on the relationship between exports and economic growth.

CHAPTER FOUR

RESULTS AND INTERPRETATION

4.0 Introduction

This intends to present the results from the regression using a model that was detailed in chapter 3 and also continues to carry out the diagnostic tests to confirm that the correct model is chosen. Based on the Hausman test, REM model was chosen. Furthermore, the chapter gives the appearance of the results that were produced by means of E-views 10 package of statistics.

4.1 Summary Statistics

Table 4.1: Summary Statistics Results

	RGDP	**EXPO**	**PG**	**FDI**	**INF**	**RGMAN**
Mean	5.324115	37.41596	2.076566	5.189487	394.9606	4.109303
Median	5.391173	33.93500	2.687965	3.730000	7.250000	4.002577
Maximum	27.73293	86.02000	3.430000	41.81000	34527.60	29.06926
Minimum	-7.652310	16.91000	-1.773215	-5.980000	-2.400000	-35.48214
Std. Dev	3.759301	13.47344	1.125653	6.504892	3374.504	7.116253

Source: Author's Calculations using E-Views 10, See appendix 2 for full results

4.2 Results of Diagnostic Tests

4.2.1 Panel Unit Root Test Results

The following tests were used for the unit root problems: Levin, Lin and Chu test; Im, Pesaran and Shin W-test; Augmented Dickey Fuller (ADF) Chi-square and Phillips Peron (PP) Chi-square. The table below show a summary of the results.

Table 4.2: Stationarity Test Results

Variable	**Levin, Lin & Chu Statistic**	**Im, Pesaran & Shin W-Statistic**	**ADF Fisher Chi-square Statistic**	**PP Fisher Chi-Square Statistic**	**Order of Integration**
RGDP	0.0000**	0.0000**	0.0000**	0.0000**	I (0)

EXPO	0.0000**	-	0.0000**	0.0000**	I (1)
FDI	0.0000**	0.0000**	0.0000**	0.0000**	I (0)
INF	0.0006**	-	0.0406**	0.0059**	I (0)
PG	0.0000**	0.0000**	0.0000**	0.0000**	I (1)
RGMAN	0.0000**	-	0.0000**	0.0000**	I (0)

See appendix 3.1 for full results and the (**) show that variables are stationary at 5% level of significance

Table 4.1 show that most of the variables used in the model are stationary at level except for EXPO and PG which are stationary after first difference thus integrated of order one. The null hypothesis is rejected and therefore the variables are fit to estimate the model.

4.2.2 Panel Cointegration Test

The test is conducted with the aim to identify the relationship between exports and economic growth. The Pedroni Residual Cointegration test was employed in this study and the results are given in the following table:

Table 4.3 Pedroni Residual Cointegration Test Results

	Statistic	**Prob.**	**Weighted Statistic**	**Prob.**
Panel v-Statistic	0.058103	0.1450	-0.024862	0.5099
Panel rho-Static	-1.250819	0.1055	-3.441909	0.0003
Panel PP-Static	-3.349574	0.0004	-7.997871	0.0000
Panel ADF Static	-0.645009	0.2595	-2.649807	0.0040

See appendix 3.2 for full results

The above results were tested using the Pedroni Residual Cointegration test. The results in the table show that the p-values of Panel PP-Static are 0.0004% and 0.0000 which are less than 0.05 therefore we reject the null hypothesis and conclude that exports and economic growth are cointegrated. More so, the model show that there are 2 equations which are cointegrating implying that there is long term relationship between exports and economic growth.

4.2.3 Hausman Test for Random Effects

The Hausman test was carried out in this study to test the correct model specification to be used between fixed effects model (FEM) and random effects model (REM). The probability value was 0.0806% indicating a greater value compared to 5% which leads to the acceptance of the null hypothesis and concluding that REM is the correct model. Thus, from this instance the REM model becomes the estimation model.

Table 4.4: Hausman Test for Random Effects Results

Test Summary	Chi. Sq Statistic	Chi. Sq d.f	Probability
Cross Section Random	9.818207	5	0.0806

See appendix 3.3 for more full results

4.2.4 Breusch-Pagan Lagrange Multiplier (LM) Test

The test is conducted with the aim of checking the correct format of inference. Based on the Breusch-Pagan Lagrange Multiplier (LM) test, the results indicate that at 5% level of significance, there are both no cross-sectional and time effects as indicated by the probability value of 0.0356 hence the Random Effects Model (REM) becomes the correct model of choice.

Table 4.5: Breusch-Pagan Lagrange Multiplier (LM) Test Results

	t-Statistic	Probability
Cross-Section	2.657535	0.1031
Time	1.756366	0.1851
Both	4.413901	0.0356

See appendix 3.4 for full results

4.3 Regression Results

Table 4.6 Random Effects Model Regression Results

Dependant Variable: Real Growth Domestic Product (RGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	1.374192	1.360023	1.010418	0.3139

EXPO	0.055195**	0.025390	2.173915	0.0313
FDI	0.019052	0.048474	0.393024	0.6949
PG	0.769712**	0.324522	2.371830	0.0190
INF	-0.000255***	8.47E-05	-3.008292	0.00031
RGMAN	0.070078*	0.041347	1.694875	0.0922

See appendix 4 for full results; (*), (**) and (***) indicate significance level at 10%, 5% and 1% respectively.

R^2 = 0.14723 Durbin-Watson stat= 1.458279

Adjusted R^2 = 0.118808 F- Statistic = 5.179615

Probability (F-statistic) = 0.000205

The results in table can also be given in the form of an equation as follows:

$$RGDP_{i,t} = 1.374192 + 0.055195EXPO_{i,t} + 0.769712PG_{i,t} + 0.019052FDI_{i,t} + 0.070078RGMAN_{i,t} - 0.0002551INF_{i,t}$$

4.4 Results Interpretation

Although all variables included in the model were expected to be significant, FDI were found to be insignificant since their probability values were greater than 0.01, 0.05 and 0.10. It is important to note that real gross domestic product is influenced by other variables such as population growth, real growth in manufacturing and inflation.

R^2 of 14.72% show that differences in economic growth are explained by the model and 85.28% are explained by factors not involved in the model. Adjusted R^2 of 11.88% depict that fluctuations of economic growth are strong-minded by the research model when taking into consideration the degrees of freedom, while 88.12% is capturing other aspects outside the model. Fama and French (1992) alluded that R^2 usually is low in cross sectional data and higher in time series thus Achen (1982) rejected the use of coefficient of determination as it only explains variances in regression. A combination of time series data and cross-sectional data would increase R^2 if at least a dummy variable is included in the estimated regression model. Furthermore, Mayer (1975) argued that in the event that R^2 is low, goodness of fit of the model would be based on F-static and F-probability value values, therefore low R^2 and

adjusted R^2 in this study show that a dummy variable has not been included in the regression model.

The F-statistic of the model is 5.179615 which implies that it is viable whilst the Durbin-Watson statistic of 1.458279 is approximately closer to 2 thus terminating the possibility serial correlation. The aforementioned results show that the model was correctly specified thus the results may be considered for policy recommendations.

4.4.1 Exports (EXPO)

As expected in chapter three, positive relationship between exports and economic growth was highlighted by the results in this study. The findings of this study show that a 1% increase in exports result in 0.055195% increase in economic growth ceteris paribus. Furthermore, the p-value for EXPO is 0.0313 was obtained which is less than 0.05 and also the modulus t-statistic is 2.173915 which is greater than 2 thus proving that the export is a significant contributor to economic growth. These results are supported by the Ricardian theory, Absolute advantage theory, Dual Growth model and Export led Growth theory which were mentioned in chapter two in theoretical literature review.

More so, A positive relationship that has been obtained can be justified on the basis of the findings by Feder (1982) who investigated sources of growth in a group of 55 developing economies for the period 1964-1973 using Ordinary Least Squares (OLS). Herzer *et al.* (2006) also found positive association existing on exports and economic growth in Chile for the period 1960-2000. More so, Chigusiwa *et al.* (2011) found exports as a contributor to economic growth in study that was carried out in Zimbabwe between 1977 and 2006. Other scholars in literature who found a positive relationship between exports and economic growth include Biyase and Zwane (2014), Cuaresma and Worz (2005), Kumar (2015), Krishan *et al.* (2008) and Hassan (2007).

4.4.2 Population Growth (PG)

In chapter three, population growth was estimated to give a positive relationship with economic growth. The results of the study show that a positive relationship was generated as shown by 1% increase in population resulting in 0.76712% increase in economic growth. More so, the p-value of 0.0190 was obtained which is less than 0.05 and the t-statistic of 2.371830 which is greater than 2 proving that the variable is statistically significant to contribute to economic growth. These results are in line with the that population growth drives economic growth as mentioned by Todaro and Smith (2012).

4.4.3 Foreign Direct Investment Inflow (FDI)

As estimated in chapter three, FDI was expected to have a positive relationship with economic growth. Shockingly, according the study findings, the variables proved to be statistically insignificant in the contribution of economic growth. The probability value of 0.6949 which is far greater than 5% and the t-statistic of 0.048474 which is less than 2 shows that the variable is statistically insignificant.

4.4.4 Real Growth in Manufacturing (RGMAN)

In chapter three, real growth in manufacturing was estimated to have a positive relationship with economic growth. The study findings show that a positive relationship existed between real growth in manufacturing and economic growth. A 1% increase in RGMAN results in 0.070078% increase in economic growth. These results are in conjunction with the views of Clark (1957) who echoed that continuous growth in manufacturing results in increase in economic growth.

4.4.5 Inflation (INF)

Inflation proved to contribute negatively to economic growth as expected from chapter three. The findings of this study show that a 1% increase in economic growth results in a 0.00025% decrease in economic growth. The p-value of 0.00031 which is less than 0.05 and a t-statistic of 3.008292 which is greater than 2 which shows that the variable is statistically significant. The results are in line with the arguments Blackard *et al.* (2010) and the findings from a study that was carried out by Biyase and Zwane (2014).

4.5 Conclusion

The model used in the study to estimate the variables provided greater analysis on the contribution of exports to economic growth in the SADC region. The chapter presented the results generated in the estimated equation and furthermore the interpretation of the estimated results of diagnostic tests and the regression model. The variable in question provided a significant contribution to economic growth. Chapter 5 intends to give some possible policy recommendations and also suggested future studies on the basis of the findings obtained in this study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

The chapter gives an overview of the findings that were obtained in the study. Based on these findings, an evaluation of whether the objectives highlighted in chapter one is made thus a decision on the hypothesis statement concerning rejection or acceptance of the null hypothesis is made. Furthermore, the chapter gives policy recommendations and areas of further study.

5.1 Summary of the Study

The main goal of this research was to observe the role of exports to economic growth in the thirteen Southern African Development Community (SADC) countries for the period between 2005 and 2016. The researcher was motivated to carry out this study as a result of a decrease in economic performance evidenced by some SADC members which include Botswana, Mozambique, South Africa, Zambia and Zimbabwe. Chapter one provided an analysis of the relationship between exports and economic growth. In chapter two, literature was reviewed on the other researchers and scholars who gave insights on the connection existing on exports and economic growth in various countries. The review was of great importance since the foundations of the study stemmed from the various arguments raised. Chapter three gave the specification of the model riding on the shoulders of other scholars in literature and the fourth chapter gave the results of the estimated model coupled with the interpretation. The findings of this study revealed that exports have a positive contribution to economic growth in SADC and more so, population growth and inflation proved to be significant.

5.2 Conclusions

The main objective of the study was to identify the contribution of exports to economic growth in SADC. The results of the study provided a positive contribution of exports to economic growth in the SADC region for the thirteen countries between the period 2005 and 2016 hence calling for compliance and support of the exportation of goods and services with the aim to increase exports thus increasing economic growth. Findings in this study strongly justify the rejection of the null hypothesis (exports do not contribute to economic growth) and hence reaching to the conclusion that exports contribute to economic growth in Southern African Development Community (SADC).

5.3 Policy Recommendations

The results of this study indicate that exports are statistically significant at 5% and have a positive contribution to economic growth in Southern African Development Community (SADC) countries. As shown by SADC (2018), about 45% of the exports from the region are directed to Asian Pacific Economic Cooperation (APEC) and 27% to the European Union (EU). Basing on these statistics, it is recommended that countries such as Angola, Botswana, DRC, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe would focus on policies that encourage exportation of goods and services and free trade agreements with countries which are in the European Union (EU) and the Asian Pacific Economic Cooperation (APEC) so as to secure the export market with the aim to boost economic growth and improving international relations. More so, the extension of the Customs and Trade Facilitation in the Southern African Development Community (SADC) is also recommended to allow easier transportation of exports to developed countries such as China and United States of America thus allowing countries which are landlocked in the Southern African such as Zimbabwe and Botswana to increase their exportation hence boosting economic growth. The extension of Customs and Trade Facilitation would enable such countries to use routes which have direct access to sea ports and ocean ports which in countries like South Africa, Tanzania and Mozambique.

5.4 Future Research Suggestions

The model used in this study did not take into account other variables that contribute to economic growth such real growth in mining, real growth in agriculture, real growth in services and real growth in manufacturing which were not included in the model for reasons beyond the discretion of the researcher. Furthermore, other estimation techniques such Error Correction Model (ECM) and Autoregressive Distribution Lag (ARDL) may also be conducted on the same study. Hence, riding on these arguments further studies may be conducted

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APPENDICES

Appendix 1: Dataset used in the Regression Model

Country	Year	RGDP (%)	RGMAN (%)	PG (%)	FDI (%)	EXPO (%)	INF (%)
Angola	2005	15.0	6.1	2.95	-4.6	86.0	43.5
Angola	2006	11.5	6.5	3.09	-0.09	79.8	23
Angola	2007	14.0	2.0	3.10	-1.48	73.96	13.3
Angola	2008	11.2	6.0	3.02	1.99	76.32	12.2
Angola	2009	2.1	7.0	3.02	2.92	54.91	12.5
Angola	2010	3.6	19.2	3.06	-3.91	69.39	13.7
Angola	2011	1.9	10.2	3.22	-2.9	65.35	14.5
Angola	2012	7.6	10.8	3.25	-5.98	62.31	13.5
Angola	2013	4.3	14.1	3.29	-5.7	55.59	10.3
Angola	2014	4.2	10.0	3.33	1.52	48	8.8
Angola	2015	4.9	10.2	3.38	9.02	33.45	7.3
Angola	2016	5.4	10.4	3.43	4.31	30.0	10.3
Botswana	2005	4.6	1.8	1.17	4.24	52.92	8.6
Botswana	2006	8.4	20.0	1.27	4.81	52.25	11.6
Botswana	2007	8.3	25.7	1.27	4.52	54.52	7.1
Botswana	2008	6.2	-2.6	1.27	4.76	45.67	12.7
Botswana	2009	-7.7	5.0	1.27	2.03	34.8	8
Botswana	2010	8.6	3.9	1.27	1.71	43.64	6.9
Botswana	2011	6.0	11.4	1.90	8.74	48.9	8.5

Botswana	2012	4.8	3.7	1.90	3.7	48.36	7.5
Botswana	2013	9.3	6.5	1.90	2.67	61.51	5.9
Botswana	2014	4.4	0.4	1.90	3.17	60.83	4.4
Botswana	2015	4.3	1.0	1.90	4.71	52.23	3.1
Botswana	2016	4.0	1.5	1.90	0.07	55.4	3.8
DRC	2005	6.1	18.2	3.00	1.5	20.4	21.3
DRC	2006	5.3	8.2	3.00	1.79	19.34	13.1
DRC	2007	6.3	4.9	3.00	11.05	39.36	16.9
DRC	2008	6.2	2.5	3.00	8.99	40.21	17.3
DRC	2009	2.9	1.8	3.00	13.36	27.38	2.8
DRC	2010	7.1	-35.5	3.00	7.07	43.5	7.1
DRC	2011	6.9	1.8	3.00	7.07	45.36	15.3
DRC	2012	13.4	5.3	3.00	12.06	34	9.7
DRC	2013	2.4	10.1	3.00	6.99	33.87	1.6
DRC	2014	7.2	9.9	3.40	5.42	33.19	2.5
DRC	2015	7.0	10.2	3.40	4.62	31.32	2.7
DRC	2016	5.3	10.5	3.40	3.77	26.15	2.7
Lesotho	2005	2.7	-11.8	0.11	1.63	48.63	3.4
Lesotho	2006	4.3	8.3	0.13	1.35	48.71	6.1
Lesotho	2007	4.7	1.8	0.14	4.15	49.19	8
Lesotho	2008	5.7	1.9	0.19	0.59	49.98	10.7
Lesotho	2009	3.4	-6.7	0.22	4.9	41.76	7.4
Lesotho	2010	7.9	13.8	0.24	0.4	39.45	3.6
Lesotho	2011	4.0	-11.9	0.10	2.19	44.14	5

Lesotho	2012	5.0	-3.4	0.33	2.12	38.67	6.1
Lesotho	2013	4.6	-10.0	0.36	2	35.82	4.9
Lesotho	2014	3.5	-1.5	0.39	3.61	35.62	5.3
Lesotho	2015	3.3	1.0	0.42	4.52	40.39	3.2
Lesotho	2016	3.0	1.6	0.45	3.51	42.25	6.6
Madagascar	2005	4.6	2.9	2.78	1.7	28.21	18.4
Madagascar	2006	5.0	3.0	2.76	5.34	29.73	10.8
Madagascar	2007	6.2	10.8	2.74	10.75	30.32	10.3
Madagascar	2008	7.1	3.1	2.71	12.05	26.54	9.3
Madagascar	2009	-4.0	-9.3	2.70	15.13	22.37	9
Madagascar	2010	0.2	-2.4	2.69	9.28	24.97	9.2
Madagascar	2011	1.4	3.9	2.68	8.24	26.74	9.5
Madagascar	2012	3.0	2.7	2.75	8.21	29.01	5.7
Madagascar	2013	2.4	2.1	2.75	5.33	29.24	5.8
Madagascar	2014	2.0	-6.9	2.67	3.29	31.91	6.1
Madagascar	2015	2.0	-4.0	2.67	5.31	32.06	7.4
Madagascar	2016	2.0	-3.8	2.65	5.41	33.5	6.7
Malawi	2005	2.6	4.3	3.32	3.82	18.12	15.4
Malawi	2006	2.2	7.8	3.32	0.89	17.63	14
Malawi	2007	9.1	17.1	3.31	2.81	23.31	8
Malawi	2008	7.8	11.0	2.80	3.67	22.66	8.7
Malawi	2009	7.5	29.1	3.14	0.79	20.03	8.4
Malawi	2010	6.8	11.4	3.11	1.39	22.79	7.4
Malawi	2011	4.9	1.4	3.11	10.16	20.78	7.6

Malawi	2012	-0.6	-0.9	3.12	0.03	26.2	21.3
Malawi	2013	6.3	5.6	3.13	8.18	35.66	27.3
Malawi	2014	6.0	5.0	3.14	9.88	33.7	23.8
Malawi	2015	5.8	4.9	3.15	8.14	29.33	21.9
Malawi	2016	5.5	5.4	3.16	5.99	33.14	21.7
Mauritius	2005	1.5	-3.5	0.53	0.66	59.85	4.9
Mauritius	2006	4.5	4.8	0.46	1.52	58.44	8.9
Mauritius	2007	5.9	2.6	0.41	4.18	55.87	8.8
Mauritius	2008	5.5	3.3	0.31	3.78	51.07	9.7
Mauritius	2009	3.1	2.5	0.25	2.81	47.68	2.5
Mauritius	2010	4.1	1.9	0.20	4.3	51.24	2.9
Mauritius	2011	3.9	0.7	0.20	3.76	52.44	6.5
Mauritius	2012	3.3	2.2	0.27	5.05	53.79	3.9
Mauritius	2013	3.3	4.4	0.19	2.42	48.42	3.5
Mauritius	2014	3.7	2.2	0.10	3.27	51.06	3.2
Mauritius	2015	3.9	2.8	0.10	1.78	48.79	1.3
Mauritius	2016	4.2	4.2	0.10	2.87	44.49	1
Mozambique	2005	8.7	2.1	2.39	1.58	30.19	7.2
Mozambique	2006	9.9	3.0	2.39	3.02	30.22	13.2
Mozambique	2007	7.4	3.1	2.75	4.45	30.84	8.2
Mozambique	2008	6.9	-2.8	2.77	5.58	29.24	10.3
Mozambique	2009	6.4	0.0	2.78	8.52	29.97	3.3
Mozambique	2010	6.7	3.1	2.79	12.39	31.51	12.7
Mozambique	2011	7.1	2.1	2.79	27.9	33.43	10.4

Mozambique	2012	7.2	0.1	2.79	38.77	32.38	2.1
Mozambique	2013	7.1	4.1	2.76	41.81	30.37	4.2
Mozambique	2014	7.2	2.0	2.72	29.47	33.36	2.3
Mozambique	2015	7.1	2.5	2.72	26.14	32.22	2.4
Mozambique	2016	7.2	2.8	2.69	28.4	34.76	10
Namibia	2005	1.7	7.4	1.77	5.41	40.45	2.3
Namibia	2006	7.4	2.6	1.74	7.64	45.47	5
Namibia	2007	4.9	8.5	1.86	7.66	50.48	6.5
Namibia	2008	2.6	4.9	1.82	8.83	54.35	9.1
Namibia	2009	0.3	2.1	1.84	9.42	52.35	9.5
Namibia	2010	6.0	7.3	1.90	2.55	47.76	4.9
Namibia	2011	5.1	5.6	-1.77	6.54	45.53	5
Namibia	2012	5.1	-6.8	1.84	8.41	43.41	6.7
Namibia	2013	5.7	4.0	1.87	6.2	41.19	5.6
Namibia	2014	6.4	-2.2	1.89	3.49	38.71	5.4
Namibia	2015	6.8	-1.5	1.90	10.22	39.05	3.4
Namibia	2016	7.3	3.0	1.92	2.75	42.23	6.7
South Africa	2005	5.3	2.8	1.32	2.53	26.45	3.4
South Africa	2006	5.6	-1.5	1.35	0.23	29.27	4.6
South Africa	2007	5.4	4.9	1.38	2.2	31.17	7.1
South Africa	2008	3.2	6.2	1.40	3.44	35.62	11.5
South Africa	2009	-1.5	6.4	1.43	2.57	27.91	7.1
South Africa	2010	3.0	5.2	1.46	0.98	28.62	4.3
South Africa	2011	3.2	2.6	1.49	0.99	30.46	5

South Africa	2012	2.2	-10.1	1.52	1.17	29.72	5.7
South Africa	2013	2.2	5.5	1.55	2.24	30.88	5.8
South Africa	2014	1.5	3.6	1.58	1.65	31.21	6.1
Tanzania	2005	7.4	9.6	2.90	5.53	16.91	5
Tanzania	2006	4.7	8.2	2.90	2.17	17.1	7.3
Tanzania	2007	8.5	11.4	2.90	2.7	18.92	7
Tanzania	2008	5.6	11.4	2.90	5.05	18.65	10.3
Tanzania	2009	5.4	4.5	2.90	3.33	17.37	12.1
Tanzania	2010	6.4	8.9	2.90	5.77	18.75	6.2
Tanzania	2011	7.9	6.7	2.90	3.63	20.76	12.7
Tanzania	2012	5.1	4.2	2.70	4.6	21.29	16
Tanzania	2013	7.3	6.6	2.70	4.71	17.65	7.9
Tanzania	2014	7.0	6.8	2.70	3.47	19.41	6.1
Tanzania	2015	7.0	7.0	2.70	3.52	21.62	5.6
Tanzania	2016	6.9	7.3	2.70	2.88	19.48	5.2
Zambia	2005	7.2	4.1	3.17	4.28	30.61	18.3
Zambia	2006	7.9	7.1	3.13	4.83	32.52	9
Zambia	2007	8.4	4.5	3.06	9.42	33.59	10.7
Zambia	2008	7.8	3.4	3.01	5.24	28.92	12.4
Zambia	2009	9.2	4.0	2.96	4.28	29.25	13.4
Zambia	2010	10.3	6.2	2.80	8.53	37.03	8.5
Zambia	2011	6.3	8.1	3.10	4.73	40.47	6.4
Zambia	2012	6.7	7.3	3.00	6.79	40.08	6.6
Zambia	2013	6.7	4.7	3.00	7.49	40.48	7

Zambia	2014	5.6	3.7	3.00	5.55	38.82	7.8
Zambia	2015	5.6	3.8	3.00	7.48	37.14	10.1
Zambia	2016	5.4	3.2	3.10	7.48	35.14	17.9
Zimbabwe	2005	-4.1	-9.9	-1.27	1.79	33.55	302.12
Zimbabwe	2006	-3.6	11.2	1.52	0.73	35.96	1096.68
Zimbabwe	2007	-3.3	-4.6	0.25	1.3	37.79	24411.03
Zimbabwe	2008	-2.8	-8.8	0.68	1.17	41.47	34527.6
Zimbabwe	2009	27.7	-2.6	0.97	1.22	21.84	6.2
Zimbabwe	2010	11.4	23.2	0.86	1.21	35.19	3.03
Zimbabwe	2011	11.9	1.9	3.39	2.85	40.56	3.28
Zimbabwe	2012	10.6	13.7	1.10	2.46	30.24	3.98
Zimbabwe	2013	4.5	5.3	1.00	2.41	27.17	1.63
Zimbabwe	2014	3.8	-0.6	1.93	2.98	25.68	-0.22
Zimbabwe	2015	3.8	6.8	1.95	2.45	23.46	-2.4
Zimbabwe	2016	4.3	7.3	1.97	2.06	24.66	-1.57

Source: World Bank (WB), International Monetary Fund (IMF), SADC

Appendix 2: Summary Statistics

	RGDP	EXPO	FDI	INF	PG	RGMAN
Mean	5.324115	37.41596	5.189487	394.9606	2.076566	4.109303
Median	5.391173	33.93500	3.730000	7.250000	2.687965	4.002577
Maximum	27.73293	86.02000	41.81000	34527.60	3.430000	29.06926
Minimum	-7.652310	16.91000	-5.980000	-2.400000	-1.773215	-35.48214
Std. Dev.	3.759301	13.47344	6.504892	3374.504	1.125653	7.116253
Skewness	0.965319	0.900932	3.069321	9.029704	-0.865294	-0.698997
Kurtosis	11.31140	3.921341	15.44264	84.62582	2.891580	9.698565
Jarque-Bera	473.2439	26.62127	1251.264	45427.95	19.54350	304.3635
Probability	0.000000	0.000002	0.000000	0.000000	0.000057	0.000000
Sum	830.5619	5836.890	809.5600	61613.86	323.9444	641.0513
Sum Sq. Dev.	2190.514	28137.71	6558.611	1.77E+09	196.3996	7849.364
Observations	156	156	156	156	156	156

Appendix 3: Diagnostic Tests

3.1 Unit Root Test Results

3.1.1 EXPO Unit Root test results

Panel unit root test: Summary
Series: D(EXPO)
Date: 04/13/18 Time: 18:57
Sample: 2005 2016
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-11.5826	0.0000	13	125
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	151.064	0.0000	13	125
PP - Fisher Chi-square	152.474	0.0000	13	130

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.1.2 RGDP Unit Root test results

Panel unit root test: Summary
Series: RGDP
Date: 04/08/18 Time: 14:37
Sample: 2005 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.70260	0.0000	13	142
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.08543	0.0000	13	142
ADF - Fisher Chi-square	70.0365	0.0000	13	142
PP - Fisher Chi-square	80.2313	0.0000	13	143

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.1.3 FDI Unit Root test results

Panel unit root test: Summary
Series: FDI
Date: 04/08/18 Time: 14:39
Sample: 2005 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.56084	0.0000	13	139
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.01085	0.0000	13	139
ADF - Fisher Chi-square	80.5698	0.0000	13	139
PP - Fisher Chi-square	78.1342	0.0000	13	143

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.1.4 INF Unit Root test results

Panel unit root test: Summary
Series: INF
Date: 04/13/18 Time: 19:00
Sample: 2005 2016
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.24395	0.0006	13	141
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	39.8203	0.0406	13	141
PP - Fisher Chi-square	47.6950	0.0059	13	143

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.1.5 RGMAN Unit Root test results

Panel unit root test: Summary
Series: RGMAN
Date: 04/13/18 Time: 19:02
Sample: 2005 2016
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.90396	0.0000	13	142
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	85.8012	0.0000	13	142
PP - Fisher Chi-square	85.1285	0.0000	13	143

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.1.6 PG Unit Root test results

Panel unit root test: Summary
Series: D(PG)
Date: 04/08/18 Time: 14:55
Sample: 2005 2016
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.4698	0.0000	11	108
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.36819	0.0000	11	108
ADF - Fisher Chi-square	76.9255	0.0000	11	108
PP - Fisher Chi-square	118.664	0.0000	11	110

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3.2 Pedroni Residual Cointegration Test Results

Pedroni Residual Cointegration Test
Series: RGDP EXPO
Date: 05/21/18 Time: 09:36
Sample: 2005 2016
Included observations: 156
Cross-sections included: 13
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	1.058103	0.1450	-0.024862	0.5099
Panel rho-Statistic	-1.250819	0.1055	-3.441909	0.0003
Panel PP-Statistic	-3.349574	0.0004	-7.997871	0.0000
Panel ADF-Statistic	-0.645009	0.2595	-2.649807	0.0040

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	-0.944069	0.1726
Group PP-Statistic	-8.031243	0.0000
Group ADF-Statistic	-3.246323	0.0006

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
Angola	0.532	8.048663	8.048663	0.00	11
Botswana	-0.281	11.44459	11.44459	0.00	11
DRC	-0.407	5.799396	4.842288	2.00	11
Lesotho	-0.144	1.759871	2.242092	2.00	11
Madagascar	0.243	6.332728	6.332728	0.00	11
Malawi	0.206	6.462186	6.462186	0.00	11
Mauritius	0.153	0.834866	1.139614	1.00	11
Mozambique	0.471	0.554367	0.460392	2.00	11
Namibia	-0.293	1.842686	0.894943	7.00	11
South Africa	0.366	2.878603	1.537531	7.00	11
United Republ...	-0.613	0.726797	0.319961	10.00	11
Zambia	0.354	1.601751	1.655325	1.00	11
Zimbabwe	0.566	40.70906	41.48658	1.00	11

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
Angola	0.485	8.605864	1	--	10
Botswana	-0.219	11.99108	1	--	10
DRC	-0.546	6.309983	1	--	10
Lesotho	0.258	1.725996	1	--	10
Madagascar	0.246	6.723191	1	--	10
Malawi	-0.007	6.346610	1	--	10
Mauritius	0.092	0.466289	1	--	10
Mozambique	0.098	0.199577	1	--	10
Namibia	-0.579	1.304178	1	--	10
South Africa	0.125	2.626189	1	--	10
United Republ...	-1.123	0.579481	1	--	10
Zambia	0.336	1.735331	1	--	10
Zimbabwe	0.516	44.24596	1	--	10

3.3 Breusch-Pagan Lagrange Multiplier Tests

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	2.657535 (0.1031)	1.756366 (0.1851)	4.413901 (0.0356)
Honda	1.630195 (0.0515)	-1.325280 (0.9075)	0.215608 (0.4146)
King-Wu	1.630195 (0.0515)	-1.325280 (0.9075)	0.170115 (0.4325)
Standardized Honda	2.574143 (0.0050)	-1.193254 (0.8836)	-3.306359 (0.9995)
Standardized King-Wu	2.574143 (0.0050)	-1.193254 (0.8836)	-3.352848 (0.9996)
Gourieroux, et al.*	--	--	2.657535 (0.1177)

3.4 Hausman Test for Random Effects Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.818207	5	0.0806

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
FDI	-0.023721	0.019052	0.001083	0.1936
INF	-0.000334	-0.000255	0.000000	0.0156
EXPO	0.109712	0.055195	0.001019	0.0877
PG	0.582694	0.769712	0.294587	0.7304
RGMAN	0.066029	0.070078	0.000166	0.7530

Cross-section random effects test equation:
Dependent Variable: RGDP
Method: Panel Least Squares
Date: 04/08/18 Time: 15:34
Sample: 2005 2016
Periods included: 12
Cross-sections included: 13
Total panel (balanced) observations: 156

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007257	2.101074	-0.003454	0.9972
FDI	-0.023721	0.058587	-0.404891	0.6862
INF	-0.000334	9.09E-05	-3.678904	0.0003
EXPO	0.109712	0.040790	2.689665	0.0080
PG	0.582694	0.632378	0.921432	0.3584
RGMAN	0.066029	0.043303	1.524837	0.1296

Effects Specification
Cross-section fixed (dummy variables)

R-squared	0.295395	Mean dependent var	5.323844
Adjusted R-squared	0.208596	S.D. dependent var	3.759551
S.E. of regression	3.344530	Akaike info criterion	5.360696
Sum squared resid	1543.651	Schwarz criterion	5.712603
Log likelihood	-400.1343	Hannan-Quinn criter.	5.503625
F-statistic	3.403206	Durbin-Watson stat	1.584111

Appendix 4: Random Effects Model Results

Dependent Variable: RGDP
Method: Panel EGLS (Cross-section random effects)
Date: 04/08/18 Time: 15:02
Sample: 2005 2016
Periods included: 12
Cross-sections included: 13
Total panel (balanced) observations: 156
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.374192	1.360023	1.010418	0.3139
EXPO	0.055195	0.025390	2.173915	0.0313
FDI	0.019052	0.048474	0.393024	0.6949
PG	0.769712	0.324522	2.371830	0.0190
INF	-0.000255	8.47E-05	-3.008292	0.0031
RGMAN	0.070078	0.041347	1.694875	0.0922

Effects Specification		
	S.D.	Rho
Cross-section random	0.851007	0.0608
Idiosyncratic random	3.344530	0.9392

Weighted Statistics			
R-squared	0.147233	Mean dependent var	3.993845
Adjusted R-squared	0.118808	S.D. dependent var	3.619638
S.E. of regression	3.397821	Sum squared resid	1731.778
F-statistic	5.179615	Durbin-Watson stat	1.458279
Prob(F-statistic)	0.000205		

Unweighted Statistics			
R-squared	0.154453	Mean dependent var	5.323844
Sum squared resid	1852.429	Durbin-Watson stat	1.363300

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