THE EFFECTS OF TRADE LIBERALISATION ON ECONOMIC GROWTH IN SOUTH AFRICA AND NIGERIA: A COMPARATIVE ANAYLSIS

by

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Dissertation submitted for the requirements for the degree of

MASTER OF COMMERCE IN ECONOMICS

in

FACULTY OF MANAGEMENT & LAW

(School of Economics and Management)

at the

UNIVERSITY OF LIMPOPO

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2019

DECLARATION

I declare that THE EFFECTS OF TRADE LIBERALISATION ON ECONOMIC GROWTH IN SOUTH AFRICA AND NIGERIA: A COMPARATIVE ANAYLSIS is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

SHIRLEY MALOPE 2018

ACKNOWLEDGEMENTS

To supervisor, Dr T. Ncanywa, thank you for being very understanding and supportive.

To my Mom and the rest of my family, thank you for the support and allowing me to pursue all my dreams. I will not stop making you proud.

To my friends, thank you for holding me accountable to this commitment.

ABSTRACT

This study provided a comparative analysis of the effects of trade liberalisation on economic growth in South Africa and Nigeria in the period1995 – 2015. In order to achieve the aim, autoregressive distributed lag (ARDL) test was employed to estimate both long run and short run relationships. The results of the ARDL Bounds test showed that for both South Africa and Nigeria there is a long run relationship between economic growth, trade liberalization, foreign direct investment and trade openness. However, in the long run Nigeria's trade liberalisation had a negative effect on economic growth while South Africa had a positive effect. For foreign direct investment, Nigeria has been found to have a negative and significant effect on economic growth which is contradictory to South Africa which had a positive and insignificant effect. Trade openness showed comparative results for both countries as both showed positive and significant results. It has been found that the speed of adjustment to equilibrium was higher for Nigeria (86%) than South Africa (18%). To test for shocks impulse response functions and variance decomposition were utilised. Impulse response function Variance decomposition showed that the effects of the variables on economic growth differ between the countries over the period. Lastly the diagnostic tests found that there was no heteroscedasticity, no serial correlation and the model is normally distributed. The CUSUM and CUSUM of Squares test showed that the models where stable throughout the observation period.

It can be concluded that both South Africa and Nigeria have a long and short run relationship between trade liberalization and economic growth. However, Nigeria converged faster than South Africa to equilibrium. It is recommended that a country like South Africa should learn from a country like Nigeria as they both have natural resources that can be traded to improve their economies. South African policymakers should focus on policies that could promote , foreign direct investment.

KEY CONCEPTS:

Trade liberalization, Trade openness, Foreign Direct Investment, Gross Domestic Product,

JEL CODES: F35, F43

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ACRONYMS

SSA	- Sub-Saharan Africa
COMESA	- Common Market for Eastern and Southern African
SADC	- Southern African Development Community
EAC	- East African community
AGOA	-African Growth and Opportunity Act
OPEC	- Organisation of the Petroleum Export Countries
IMF	- International Monetary Fund
GDP	- Gross Domestic Product
FDI	- Foreign Direct Investment

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 Introduction and Background

With severe droughts in Southern and Eastern Africa, low commodity prices that have negatively affected sub-Saharan Africa (SSA) have left the region evaluating the importance of trade in the economic growth. Trade has always been important in the development of economies in Sub-Saharan Africa with regional economic communities such as the Southern African Custom Union and the East African Community having been in existence since 1910 and 1919 respectively (Negasi, 2009). Since then other economic communities like Common Market for Eastern and Southern African (COMESA), Southern African Development Community (SADC) and recently the COMESA–SADC–EAC tripartite agreement which is expected to cover 26 countries almost half of the SSA population (SADC, 2012). However even with increased trade within in the region, according to the International Monetary Fund (IMF) (2017) output was only estimated to grow by 1.6 % in 2016 and 2.8% in 2017. Therefore, the impact that trade has had in the region need to be investigated with specific focus on primary commodities such as agriculture which are the region's largest exports (Brenton, Dihel, Gillson & Hoppe, 2011).

Theoretically, trade liberalisation should have a positive effect on economic growth, but empirical evidence has been found not to be conclusive especially in developing and emerging markets (Onafowora & Owaye, 1998; Sarkar, 2005). These findings reflect the competitive international trade environment that requires lower prices and more diversified products which some developing countries struggle especially in important sectors such as agriculture and textiles (Olaifa, Kolawole & Biala, 2013; Weisbrot & Baker, 2003).

This study will focus on two of Africa's largest and most developed economies in terms of output - South Africa and Nigeria (International Monetary Fund, 2017). Recently South Africa's eligibility as a benefactor for the African Growth

and Opportunity Act (AGOA) was cast into doubt (Pienaar & Partridge, 2016). And the Nigerian government lost around US$18 billion in oil revenues due to increased supply of the commodity by countries are not members of Organisation of the Petroleum Export Countries (OPEC) which occurred concurrently with a decrease in oil consumption in large exporting regions like China and Europe (PriceWaterhouseCoppers, 2016). Trade liberalisation and its impact on economic growth moved to the forefront of the regions agenda.

1.2 Statement of the Problem

International financial organisations such as World Bank and International Monetary Fund (IMF) have adopted trade liberalisation as one of their major condition for granting economic assistance to developing countries (Onafowora & Owaye, 1998; Santos-Paulino, 2005). Therefore, countries such as South Africa and Nigeria have had to open to more trade in the hope of reaping positive effects on their economies. As much as the economies are open to trade they are also vulnerable to trade effects. This could make developing countries suffer as they fail to compete internationally (Peasah & Barnes, 2016). This is because developing countries were unable to improve their methods of production and technologies in line with demand in the competitive international markets.

Trade liberalisation has been observed to have a positive relationship with economic growth (Lucas, 1988; Rivera-Batiz & Romer, 1991; Devereux & Lapham, 1994) but this has not been the consensus in developing countries such as Nigeria and South Africa. This lack of consensus is evident in empirical literature of which was found to be inconclusive. According to Manwa (2015), Peasah and Barnes (2016), these inconclusive results were due to out-dated methodological approaches, inappropriate proxies, lack of data availability and the inaccurate assumptions of homogenous production functions among developing countries.

The relative importance of trade liberalisation on economic growth can be observed as trade is a percentage of GDP. In South Africa trade as percentage

of GDP increased from 40.8% in 1994 to 62.5% in 2015. However, for Nigeria trade as a percentage of GDP declined from 48.3% in 1981 to 21.4% in 2015 (World Bank, 2017). This clearly indicates that despite the inconclusive literature, trade liberalisation does have an effect on economic growth in these countries, but it is the difference in policies that determine the extent of the effect.

Therefore, it was interesting to compare how trade liberalization can do so in Nigeria and South Africa. It was also interesting to find out whether foreign direct investment can influence growth in a trade liberalization set up. Hence the study seeks to address the effects of trade liberalisation on economic growth and compares the economy of Nigeria and South Africa.

1.3 Research aim and objectives

1.3.1 Aim of the study

The aim of the study is to analyse and compare the effects of trade liberalisation on economic growth in South Africa and Nigeria for the period 1981-2015.

1.3.2 Objectives of the study

- To determine trade liberalisation trends for South Africa and Nigeria.
- To empirically analyse the relationship between trade liberalisation and economic growth in South African and Nigeria
- To determine the effects of specific variables on economic growth
- To state policy recommendations on trade liberalisation an economic growth in South Africa and Nigeria

1.4 Research questions

- What are the trends of trade liberalisation in South Africa and Nigeria?
- What are the effects of trade liberalisation on economic growth in South Africa and Nigeria?

- Is there directional causality in the growth-trade liberalization nexus?

1.5 Definition of concepts

For this study the following definitions have been adopted:

- Trade liberalisation is the removal of restrictions to the free flow of exchangeable goods between countries (Peasah & Barnes, 2016).
- Trade Openness is measured by the sum of exports and imports over GDP (Malefane & Odhiambo, 2018)
- Economic growth is a long run increase in a country's productive capacity measured by comparing real or national gross domestic product (GDP) from one period to another (Business Dictionary, 2017).
- Foreign Direct Investment is an investment made to acquire controlling interest in businesses operating outside of the economy of the investor (United Nations Conference on Trade and Development, 2016).

1.6 Ethical considerations

The researcher acknowledges that this research was conducted according to the set regulations of the University of Limpopo for a master's in commerce degree. The study used secondary data and will consider the plagiarism policy of the University.

1.7 Significance of the study

Many studies have look at the impact of trade liberalisation on economic growth in Sub-Saharan Africa and for each of the countries (Mwaba, 2000; Masibau, 2006; Manwa, 2015; Echekoba et al., 2015; Peasah, 2016). Most of the studies focused mainly on the effect that imports and export, as proxy for trade

liberalisation, as well as Foreign direct investment had on economic growth using time series data (Olusegun, Oluwatosin & Ayoola, 2009). This study used the tariff rates in manufactured products as a proxy for trade liberalisation and included Trade openness to estimate the overall effect on economic growth and will use ARDL approach.

Although country specific studies are available for South Africa and Nigeria, there is a gap for comparative studies between Africa's largest economies as the top exporting countries in SSA and thus important to the development of the region (Zenebe, 2013).

1.8 Structure of dissertation

This study will follow the following structure:

- Chapter 2 highlights key theoretical and empirical literature on trade liberalisation and economic growth.
- Chapter 3 focuses on the different econometric analysis methodology used in this study
- Chapter 4 provides in comparative analysis of the results from the econometric tests conducted
- Chapter 5 concludes the study's findings and offer recommendation on how these can be used to inform future research and policy.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This section reviews literature on trade liberalisation and economic growth. It is divided into two sections namely theoretical literature where trade theories are discussed and empirical literature that looks at empirical evidence of trends of trade liberalisation and the effect of trade liberalisation on economic growth.

2.2 Theoretical framework

This section firstly discusses the main trade theories among classical and neoclassical economists. It concludes with a discussion on the theories on import substitution and export-led trade liberalisation.

2.2.1 Classical and Neo-Classical trade theories

Trade liberalisation is considered as the reduction or removal of trade restrictions that exist, with the aim of allowing countries to focus resources on goods and service they can produce efficiently and import those that they cannot produce efficiently (Echekoba, Okonkwo & Adigwe, 2015). The idea that countries could trade and specialize in goods and service they have an absolute advantage in was explored by Adam Smith (1937). He found that allocation of resources improved in countries that specialised on goods and services which they had an absolute advantage and imported goods and service they had absolute disadvantage.

Adam Smith's absolute advantage trade theory was further elaborated on by David Richardo through his "Principle of Comparative Advantage" (Richardo, 1963). According to Richardo, it is more beneficial for a country to specialize in

the production of one good even though it might have absolute advantage in production of two goods compared to another country. By using one-variable factor, that is labour, the Ricardian model shows that trade will benefit both countries if each country were to export the goods its labour produced more efficiently and imported goods it was inefficient in producing (Krugman, Obstfeld & Melitz, 2012a).

As international trade progressed in the 20th century, trade theory began to take into the role of other factors of production namely: Land, capital on international specialization and mineral resources (Echekoba, et al., 2015). Taking other factors of production into account a modification to the Ricardian Model was developed by Swedish Economists Eli Heckscher and Bertil Ohlin. The Heckscher-Ohlin theory states that a country that is abundant in a factor will export the good whose production is intensive in that factor (Krugman, Obstfeld & Melitz, 2012b). The Heckscher-Ohlin as a neoclassical framework assumes that both countries have homothetic preferences and there are no differences in relative labour productiveness instead all the countries have access to the same technological capacity (Echekoba et al., 2015; van Marrewijk, Ottens & Schueller, 2012). Since countries will have the same methods of production relative prices of goods will have a large effect on the relative earnings of resources therefore international trade will result in an income effect that is strong. Owners of the abundant resource in a country will have higher gains from trade while the owners of the scarce resources will lose (Krugman et al., 2012b). In the long run, however, the factor prices are assumed to equalize as the prices of goods converge.

Trade theories agree that international trade will have the effect of not only increasing the worlds output but also improving the domestic output. We will continue looking at trade policy for developing countries.

2.2.2 New Growth Theories

Import substitution requires limiting imports of some industrial goods and substituting these products with domestically produced goods (Basu, 2005). The key argument for import substitution is the Infant industry argument that states that since developing countries have potential comparative advantage in production but due to industries not being well developed governments must focus on protecting new industries until they are internationally competitive (Krugman et al., 2012c). However, according to Mukherjee (2012), the argument of protectionism for infant industries can be sufficient if initial losses by infant industries can be compensated by future profits. But if countries do not have efficient capital markets to facilitate private investment into infant industries, rapid growth will not be achieved.

As developing countries began to experience lower economic growth and higher inflation in the mid-1970, import substitution was replaced with export-led growth. Some of the reasons that led to this policy migration were economic distortions resulting inefficiencies in production caused by import substitutions as well as the exponential export-led growth observed in the Asian "tiger" economies – Singapore, Hong Kong, South Korea and Taiwan (Palley, 2003). Exports tend to remove constraints caused by foreign exchange and it is able to offer larger access to international markets and as per the endogenous growth theory, in the long run exports are able to promote growth through higher technological innovation and opportunities to learn abroad (Echekoba, et al., 2015).

2.3 Empirical literature

This section discusses the empirical literature and starts with studies with results showing the trade liberalisation trends and the impact of trade liberalisation in different regions.

2.3.1 Trade liberalisation trends in developing nations

Jonsson and Subramanian (2001) conducted a study that used time series and cross-sectional approaches to examine the relationship between trade and total

factor productivity (TFP) in South Africa for 1970-1997. The study found trade liberalisation contributed to almost 3% growth in the manufacturing industry during the 1990's and it also contributed to faster capital accumulation due cheaper imports over the observed period. The positive relation between trade liberation and total factor production in South Africa was also observed by Teweldemedhin and van Schalkwyk (2010). In a similar study on the effects of trade liberalisation on firm productivity in India's manufacturing industry, Topalova (2004) found the positive effects of trade liberalisation on TFP was often limited to private companies thus there is a need for more policies that promote privatisation.

In a study investigating the short and long-term effects of trade liberalisation in South Africa using a dynamic micro simulation computable general equilibrium approach, Mabugu and Chitiga (2007) use removal of import tariffs and total factor productivity as proxies for trade liberalisation. The first simulation trade liberalisation was proxied by the removal of import tariffs showed that trade liberalisation in the short run had a negative effect of welfare and poverty. For the second simulation, trade liberalisation is proxied as removal of import tariffs and total factor productivity and shows a positive effect on welfare and poverty in the short and long run. The positive effect of trade liberalisation on welfare was also found by Cho and Diaz (2011) that looked at the welfare impact of trade liberalisation in Slovenia.

A study by Ahmed and Tawang (1999) on the effect of trade liberalisation on agriculture in Malaysia, found that in the long run trade liberalisation had a positive effect on agricultural sector but found that in the short run the extent of the effects differed according to sub-sectors. The more competitive industries were, they were able to benefit more from trade liberalisation. Comparable results were found in studies on the effects of trade liberalisation and agriculture in Nigeria which showed a positive relationship between trade liberalisation and the level and value of agricultural output (Akanni, Adeokun & Akintola, 2005; Ugagu, 2012). Ugagu (2012) specifically found that sub-sectors such crop

production, livestock and forestry showed a smaller positive effect whereas fish production showed larger positive effect.

Despite these findings most studies on trade liberalisation in developing countries, there are some who found that that the effect of trade on different sectors of the economy is inconclusive. According to Manwa (2015), Peasah and Barnes (2016), these inconclusive results were due to out-dated methodological approaches, inappropriate proxies, lack of data availability and the inaccurate assumptions of homogenous production functions among developing countries. In their study *"Multilateral Agricultural Trade Liberalisation: The Contrasting Fortunes of Developing Countries in the Doha Round,* Bouët, Bureau, Decreux and Jean noted that their findings were different to the existing literature as some of the previous studies have overlooked the effects of preferential agreements on industries, instead treat developing countries with great aggregation. In focussing on the economy, this study has moved away for sector specific limitations and focused on a set measurement of trade liberalisation.

2.3.2 Trade liberalisation and economic growth

In most developing regions trade liberalisation is largely driven by free trade agreements, but they have not always been found to effective in promoting trade and economic growth (Yang & Gupta, 2005; Gunning, 2001 in Turkson, 2012). The reasons stated were the lack of product differentiation, inadequate trade infrastructure, small market size and a lack of strong political will. Another reason stated by Echekoba, Okonkwo and Adigwe (2015) is that the challenged faced with trade liberalisation in developing countries does not have to do with the developing countries have been positive.

Programmes aimed at the restructuring the economy are among the ways in which developing countries try to liberalize their economies. In Nigeria the Structured adjustment programmes (SAPs), established in July 1986, are a collection of policies aimed at restructuring and redirecting the economy by removing price distortions and trade barriers while expanding the export base of the economy (Central Bank of Nigeria, 1995). Policies specifically targeted

towards the trade sector by focusing on dismantling the barriers of external trade and the development and use of local resources instead of imported material (Okoye, Nwakoby, Modebe & Okorie 2016). According to Ukwu (1994) a key pitfal of SAP was the depreciation of fomestic currency which resulted in an increase in the cpst of imports that led to higer cost of production. This made it diffuclt for local markets to compete and thus impeded the economic growth in the coountry.

Post-apartheid South Africa has implemented different trade and economic growth policies with the Accelerated Shared Growth Initiative for South Africa (ASGISA) from 2006. ASGISA's primarily focused on reducing fiscal deficits, maintaining exchange rate stability, decreasing barriers of trade and liberalizing capital flows (Mabugu & Chitiga, 2007). One of the key findings that Edwards and Lawrence (2008) stated was that despite the removal of trade sanctions in 1992, there was not a significant improvement in export growth signalling the existence of other domestic trade barriers and lag effect of foreign trade barriers. They also found that because of the lack of clarity of ASGISA on trade and South Africa's involvement in number of trade agreements, trade policies tend to be very complicated.

Echekoba, Okonkwo and Adigwe (2015) used OLS regression technique to determine the relation between trade liberalisation and economic growth in Nigeria for 1971-2012, found that imports and exports as measures of trade liberalisation has a positive effect on economic growth. Similarly using the same methodology and proxy for trade liberalisation Manni and Afzal (2012) also found that with greater trade openness real export and imports increased resulting in economic growth. The study further found that for the Bangladesh economy trade liberalisation also had a positive effect on economic development.

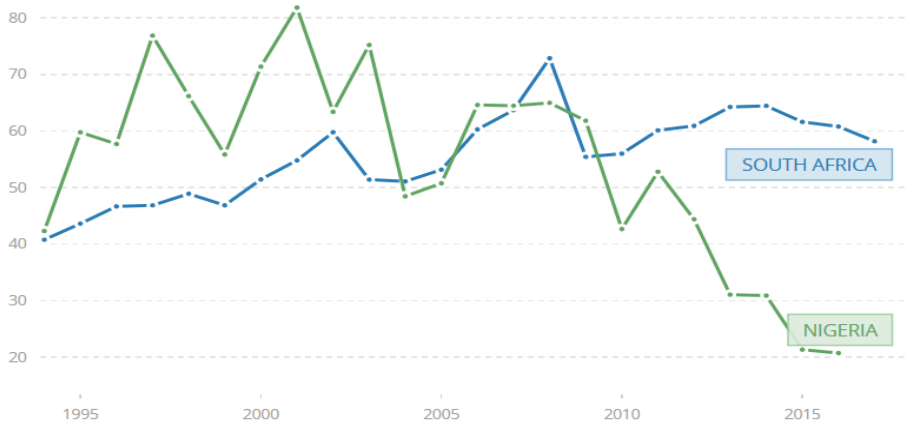
In a study investigating the impact of trade liberalisation on economic growth among SACU countries, it was found that in the case of South Africa trade openness resulted not only in economic growth but an increase in investment to the previously protected sectors (Manwa, 2015). Contrary to this finding, Cronjé

(2004) in the study “The Impact of Trade Liberalisation on the South African Automobile and Textile Industries” found that for formerly protected industries such textile and automotive industries in the short run trade liberalization had a negative effect on those industries. For the textile industry, the study found that even in the long run it still struggled which resulted in a negative effect on employment and export-led economic growth.

2.3.3 Trade trends in South Africa and Nigeria

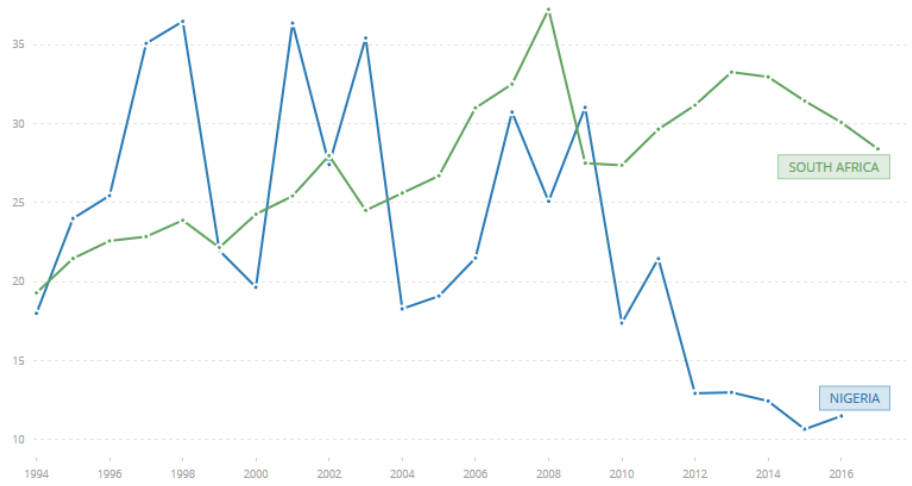
Figure 1.1 below shows trade as a percentage of GDP in South Africa and Nigeria with trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. Over the period, Nigeria peaked at 81.313% in 2001 and South Africa at 72.685%. After the 2008 world financial crisis, trade as a percentage of GDP in both sharply declines in the first year and shows signs of recovery form 2010. However, Nigeria’s recovery is not sustained as from 2011 the percentage of trade on GDP decrease sharply year on year until 2017. South Africa showed signs of recovery until 2014 where it began to slow own.

Figure 1.1: Trade (% GDP)



Source: World Bank national accounts data, and OECD National Accounts data files.

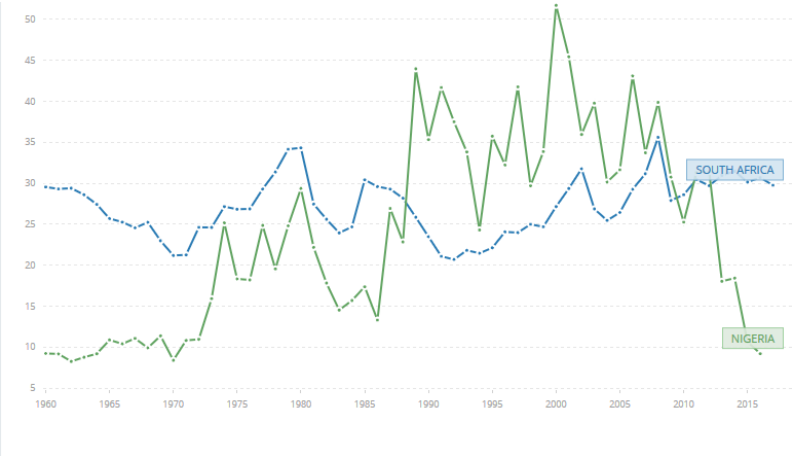
Figure1.2: Imports of goods and services (% of GDP)



Source: World Bank national accounts data, and OECD National Accounts data files.

Similarly, Nigerian exports, on average, had a higher contribution to GDP than South African exports. From 2000, Nigeria's exports seem to have been declining gradually with the sharpest decline being from 2012, 31.43%, to 2016 (9.218%). Within the same observation period, South Africa's exports have, on average, been increasing with small variations between 2012-2017.

Figure1.3: Exports of goods and services (% of GDP)



Source: World Bank national accounts data, and OECD National Accounts data files.

From the above analysis, it can be derived that the decline in Nigeria's trade was driven by the large declines in exports and imports. South Africa's post-crisis improvement is largely driven by imports. Both these outcomes are not aligned with each of the country's trade policies, SAP and ASGISA (Central Bank of Nigeria, 1995; Edwards & Lawrence, 2008).

2.4 Summary

This chapter discussed the theoretical and empirical literature on trade liberalization. Theoretical literature showed that the progress of trade theory as economies become more open and production methods improved economic growth seemed to follow. However, from empirical literature we found that although trade liberalisation improved economic growth developing countries such as South African and Nigeria did not often enjoy the benefits.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This section will outline the data and model specification that will be used as well as the econometric methods that will be employed for this study.

3.2 Data

The proposed study is quantitative in nature to be able to achieve the objectives thus mentioned. It relies on secondary data from South Africa and Nigeria. The dataset is annual and span the period 1981-2015. The data for the following variables: Gross domestic product per capita, tariff rate for manufactured products, net inflows of foreign direct investment, imports and exports of goods and services; at constant 2010 US$ was obtained from the South African Reserve Bank and Central Bank of Nigeria for each country accordingly.

3.3 Model specification

The study investigates the effect of trade liberalisation and economic growth in South Africa and Nigeria. This study employed a comparative analysis of the

Solow growth model with additional growth determinants. Economic growth will depend on trade liberalisation, foreign direct investment and population. The growth equation can be expressed as follows:

$$GDP = f(TLIB, FDI, TRDOPN) \quad (3.1)$$

The model is specified as follows:

South Africa

$$LGDP_t = \beta_0 + \beta_1 TLIB_t + \beta_2 FDI_t + \beta_3 TRDOPN_t + \varepsilon_t \quad (3.2)$$

Priori Expectations

$$\beta_1 > 0; \beta_2 > 0; \beta_3 > 0;$$

Nigeria

$$LGDP_t = \beta_0 + \beta_1 TLIB_t + \beta_2 FDI_t + \beta_3 TRDOPN_t + \varepsilon_t \quad (3.3)$$

Priori Expectations

$$\beta_1 > 0; \beta_2 > 0; \beta_3 > 0;$$

Where:

$LGDP_{t:}$ Log GDP per capita

$TLIB_t$: Tariff rate, weighted mean, manufactured products

FDI_t: Foreign direct investment

$TRDOPN_t$: by the sum of exports and imports over GDP

$\varepsilon_{t:}$ Error term

Trade openness (TRDOPN) measure is follows the working paper by Malefane and Odhiambo (2018) that found that this measure had a significant relationship

with economic growth. Trade liberalization is measured using the tariff rate as it stated among the measures of trade liberalization (Lee, 2005). Priori expectations

3.4 Estimation techniques

This section comprehensively outlines econometric estimation techniques used for time series data analysis in this study. These include unit root tests, cointegration tests, ARDL bounds tests, ARDL Error Correction Model, Diagnostic and stability tests.

3.4.1 Stationarity/Unit root test

First step in time series data analysis is to check for stationarity using unit root tests. Time series data that is stochastic in nature and shows a trend over the observation period is often non-stationary (Gujarati & Porter, 2009). Time series data to be useful for econometric analysis must be stationary, meaning it must show a constant mean and variance of the sample period. Unit root tests are thus carried out to determine stationarity, the order of integration of the variables as well as check for autocorrelation and heteroscedasticity problems which need to be avoided. Although various unit root tests are available, this study used standard unit root tests namely; the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests (Dickey, 1976; Dickey & Fuller, 1979) (Phillips, 1986) (Phillips & Perron, 1989).

The ADF unit root test investigates stationarity where error terms are considered a correlated by adding lagged differences of the time series (Dickey & Fuller, 1979). The ADF test is specified by the following equation:

$$\Delta Y_t = \beta_1 Y_{t-1} + \sum_{i=1}^{m} \alpha \Delta Y_{t-1} + \varepsilon_t \qquad (3.4)$$

Where Yt is the series being tested, m is the number of lags added and εt is the white noise. The null hypothesis being tested is β1 = 1 and the alternative β1 <1. The unit root thus exists when the null hypothesis cannot be rejected. ADF tests address issues of serial correlation in error terms by adding a lagged difference term of the dependant variable therefore lag selection is important. According to Gujarati (2004), lag selection should be determined empirically such that enough terms are included until the error terms are uncorrelated. Optimal lag length can be determined through the use Schwarz Bayesian Information Criterion (SIC) and Akaike Information Criterion (AIC). This study uses SIC it main criterion and will confirm with AIC.

The PP unit root test uses non-parametric statistical methods that modify the test statistics to correct for issues of serial correlation and heteroskedasticity (Phillips & Perron, 1989). Although like the ADF test in terms of the asymptotic distribution, the PP test addresses serial correlation in the error terms without the need of additional lagged difference terms of the dependent variable. Studies by Schwert (1989) and DeJong, Nankervis, Savins and Whiteman (1992); have found that for small data samples both tests are often inefficient in determining stationarity when the root is close to 1. Furthermore, when the trend and constant variables are added to the regression equation the strength of the test is reduced.

For the ADF test automatic lag selection was done using the Schwarz info criterion and the PP test's automatic selection of lags is done using the Newey-West Bandwidth. Both these tests are based on the following hypothesis:

H0: δ=0, Existence of unit root

H1: δ≠0, the existence of unit root is rejected

When testing the hypothesis, the unit root test results are interpreted by comparing the t-statistic with critical values:

If t- statistic > ADF / PP critical values: Do not reject null hypothesis that there exists a unit root in the series.

If t- statistic < ADF / PP critical values: Rejection of null hypothesis that unit root does not exist.

3.4.2 Auto-Regressive distributed lag (ARDL) approach bounds test

Testing for cointegration also shows if the model has a meaningful long run relationship (Nkoro & Uko, 2016). Cointegration tests include augmented Engle-Granger test (Engle & Granger, 1987) and Johansen test (Johansen & Juselius, 1990). Augmented Engle-Granger test uses the ADF test to determine cointegration between non-stationary variables (Gujarati & Porter, 2009). A key shortfall to the test is that it only permits only one cointegrating relationship (Davidson, 2002). Johansen (1989) addresses this shortfall through that uses maximum likelihood estimation to determine the number cointegrating vector in vector error correction (VEC) model. The Johansen test is, thus, able to allow more than one cointegrating relationship while determine the short and long-run determinants of the dependant variable simultaneously. The test assumes that all variables are stationary, have the same order of integration and is subject to asymptotic properties, such as large sample sizes (Johansen & Juselius, 1990). Therefore, if these do not hold the test provide on-reliable results.

The critical values are as cited by Pesaran, et al., (2001). When testing the existance of cointegration, F-statistic and the critical values are compared as follows:

- If F-statistic < Lower bound critical value: No cointegration exist
- If F-statistic> Upper bound critical value: Cointegration exists

3.4.3 Auto-Regressive distributed lag (ARDL) approach

To identify the existence of cointegration among variables, Pesaran and Shin (1999) proposed the Auto-Regressive Distributed Lag Approach (ARDL) bounds test. Unlike its predecessors, Engle and Granger (1987) and Johansen and

Juselius (1990), the bounds test can determine cointegration irrespective of whether the variables are I (0), I (1) or a combination and estimate the short and long run parameters simultaneously. Another key advantage of this test is its robust testing of small and large sample sizes (Loannides, Katrakilidis and Lake, 2005).

The ARDL model specification, in line with Pesaran, et al. (2001), is as follows:

$$\Delta LGDP = \beta_0 + \beta_1 GDP + \beta_2 FDI_{t-1} + \beta_3 LTRDOPN_{t-1} + \beta_4 TRDLIB_{t-1} + \sum_{t=1}^{p} \beta_5 i \Delta LGDP_{t-1} + \sum_{i=1}^{q} \beta_6 i \Delta FDI_{t-1} + \sum_{i=1}^{r} \beta_7 i \Delta LTRDOPN_{t-1} + \sum_{i=1}^{s} \beta_8 i \Delta TRDLIB_{t-1} + \varepsilon_t \quad (3.5)$$

3.4.4 THE ARDL Error Correction Model

The Error Correction Model (ECM) is used to test for the speed of adjustment, which Is how fast the variable will converge towards equilibrium in the long run. equation 2 below show the ARDL ECM equation for our Economic growth model.

$$\Delta LGDP = \beta_0 + \sum_{t=1}^{n} \Delta FDI_{t=i} + \sum_{t=1}^{n} \Delta TRDOPN_{t=i} + \sum_{t=1}^{n} \Delta TRDLIB_{t=i} + \lambda ECT_{t=i} + \varepsilon_t \quad \text{..... (3.6)}$$

3.4.5 Diagnostic testing

Diagnostic tests are carried to check if the ARDL model has been true or significant estimates. Firstly, the Breush-Pagan Lagrange Multiplier (LM) test will be carried out to determine whether the time and individual effect are random or stable. An autocorrelation Ljung-Box Q test will test if there is any autocorrelation between the error terms and the delayed values of the model

(Mercan, Göçer, Bulut & Dam, 2012). Heteroscedasticity was tested using Breusch-Pagan-Godfrey, Glejser and Harvey test. Normal distribution was tested using the Jarque-Bera test.

3.4.6 Vector Autoregressive (VAR) Model

The Vector Autoregression (VAR) Model is used to examine how variables affect each other. It assumes all variables are jointly endogenous and changes in a variable are due to changes in its own lags and changes in other variables. In order to determine the system's response to shocks of selected models, the VAR system needs to be transformed into a moving average (MA) (Asmah, 2013).

$$y_t = \mu + \sum_{i=0}^{\infty} \gamma_{i\varepsilon_{t-i}} \qquad (3.7)$$

Where γ_0 is the identity matrix and μ is the mean of the process. This equation is used to determine the variance decomposition and impulse response function

3.4.7 Impulse response test

For the impulse response function the Cholesky decomposition is used to show the impulse response function in the model as it ensures that shocks are uncorrelated (Sims, 1980).

3.4.8 Variance decomposition

Pesaran and Shin (1999) state that variance decomposition must be conducted to measure the percentage contribution, of each innovation to the one-step forecast error variance of the dependant variable. They also highlight that it also provides ways of determining the importance of shocks in explaining the variation in the dependant variable of the model.

3.4.8 Ramsey RESET test, CUSUM and CUSUM of squares

The Ramset RESET test was used to check if the model was correctly specified. Lastly, to test for stability CUSUM and CUSUM of Squares tests will be conducted.

3.5 Summary

This chapter has expounded on unit root tests, Auto-Regressive Distributed Lag Approach (ARDL) for cointegrations and the short/long run coefficient estimation. The ARDL method is the preferred method of estimation because, among other advantages, it allows for cointegration testing among variables that are integrated at different levels. The Error Correction Model (ECM) was used to determine the speed of adjustment. The ECM should that Nigerian variables converged faster to equilibrium than South Africa's. The Impulse response test showed that South Africa's variables had a negative response to shocks in economic growth unlike Nigeria which was a positive response. The Variance decomposition showed that South Africa's economic growth is a lot by other variables outside the model unlike Nigeria' economic growth which was largely affected by trade openness. Diagnostic and stability tests are used to assure the quality and reliability of the data used.

CHAPTER 4

PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 Introduction

The chapter applied the methodology from Chapter 3. To identify and test for stationarity graphical presentations along with the augmented Dickey–Fuller test (ADF) and Phillips – Perron unit root tests. The study adopts ARDL Bounds test to test for cointegration. The ARDL and Error Correction Model are used to test for long/short run model. The Error Correction Model will also provide details of the speed of adjustment of the variables towards equilibrium. In the analysis of the results this study will employ at 10% significance level. The Chapter conclude with diagnostic and stability tests that show the reliability and stability of the model.

4.2 Empirical tests results

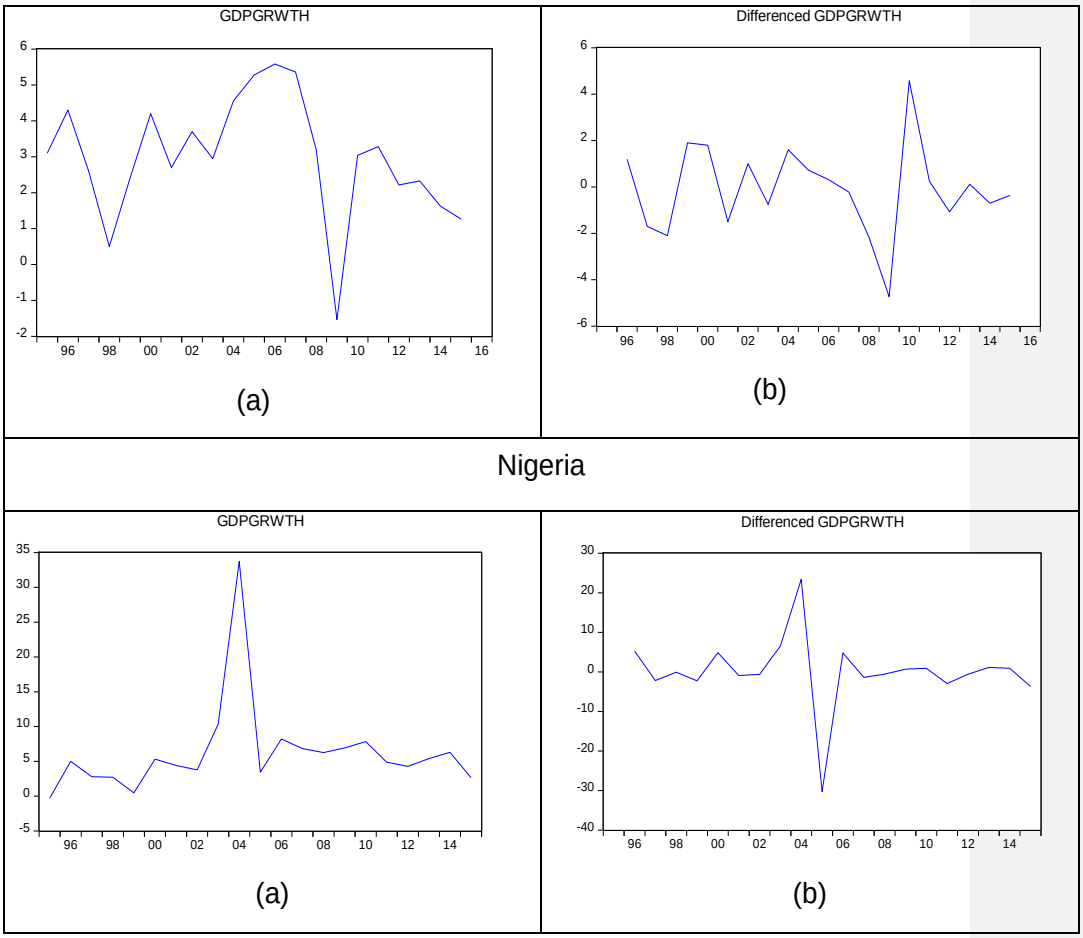
4.2.1 Stationarity/Unit Root Tests Results

Gujarati & Porter (2009) allude to time series data generally showing a trend during the sample period which indicate the possibility of the data being nonstationary. For the purpose of this study we will use Augment Dicky-Fuller (ADF) test and Phillips Perron (PP) test to determine stationarity and the order of cointegration. A key assumption of the ARDL bounds test is the that all the variables are I(0) or I(1) (Pesaran, Shin & Smith, 2001).

Figure 4.1 to Figure 4.2 provide a visual observtions of stationarity at level an first difference. The objective of this being to observe whether a trend exist or not in the time series dta before continuing with the uit root tests

Figure 4.1: GDP Growth

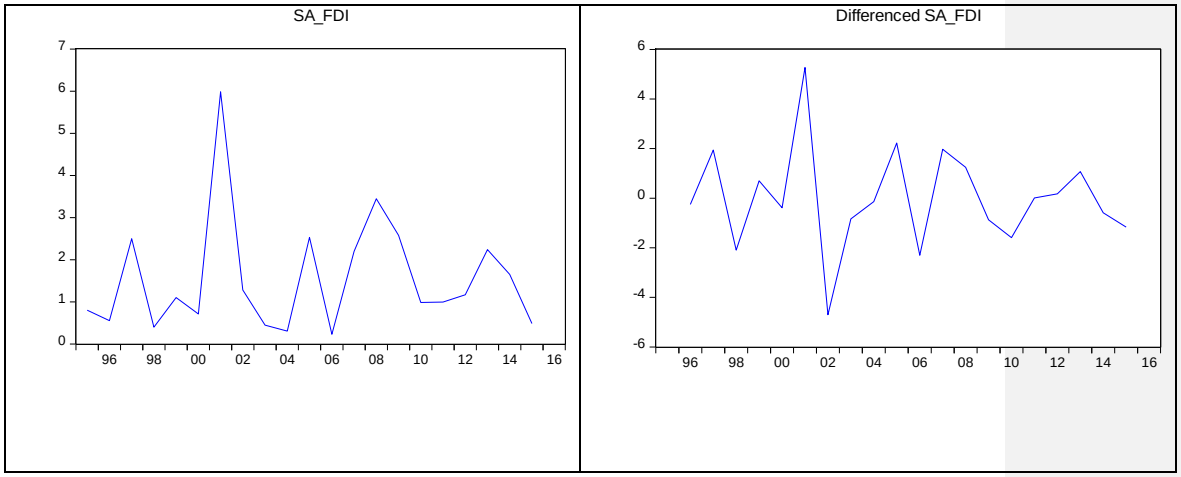
South Africa



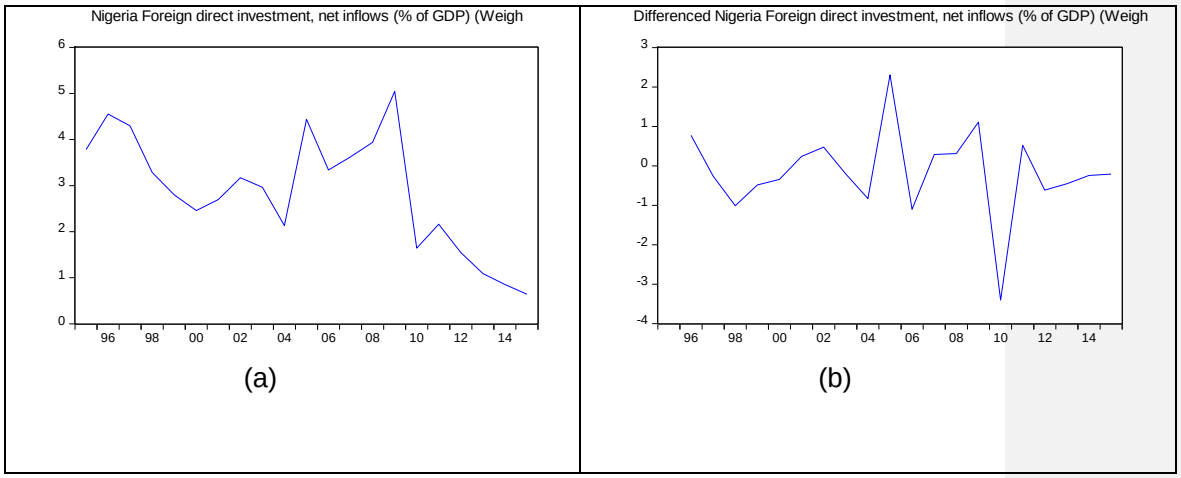
Panel (a) shows GDP growth at level form. For both South Africa and Nigeria the data seems non-stationary, with no clear mean. In panel (b), at first difference, the data seems to move towards a mean of zero for both countries.

Figure 4.2: Foreign Direct Investment

South Africa



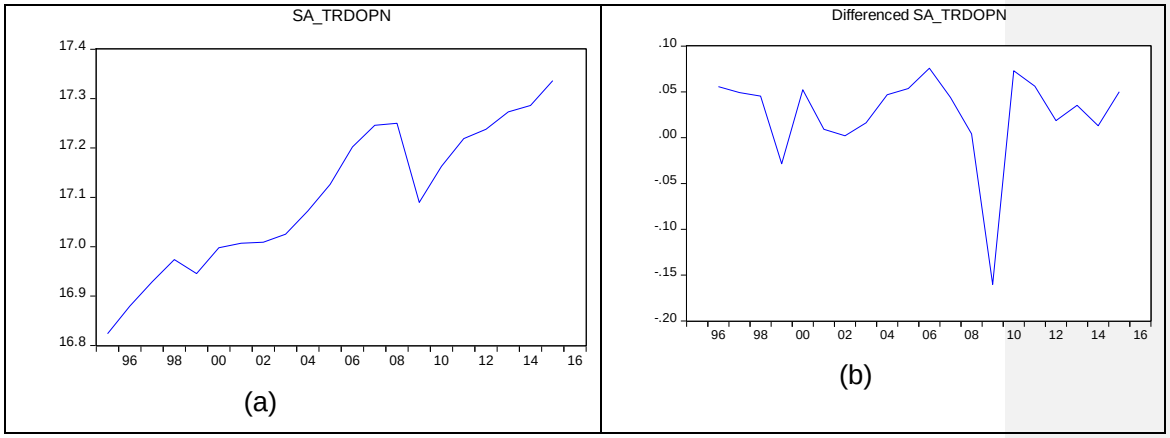
Nigeria



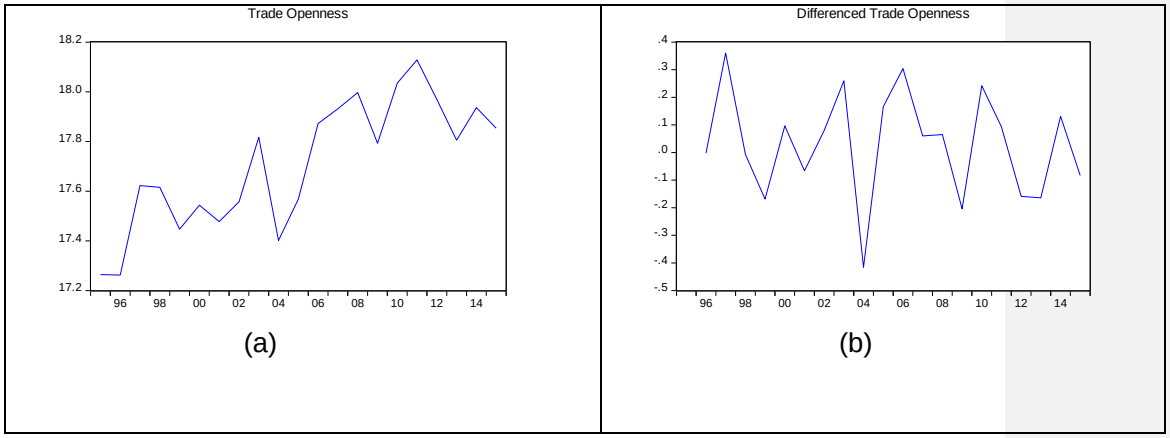
Over the observation period, in panel (a), Foreign Direct Investment (FDI) of both countries is non-stationary with Nigeria showing a downward trend over the period. At first difference, we note that both data series becomes more stationary with not clear trend dover the observation period.

Figure 4.3: Trade Openness

South Africa



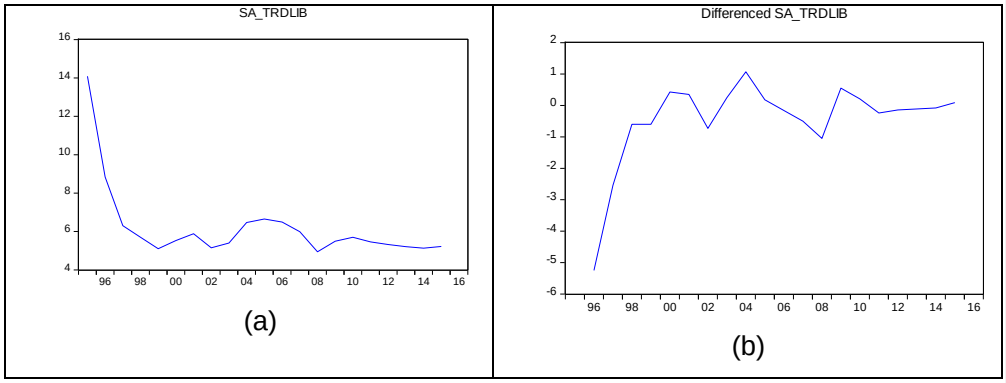
Nigeria



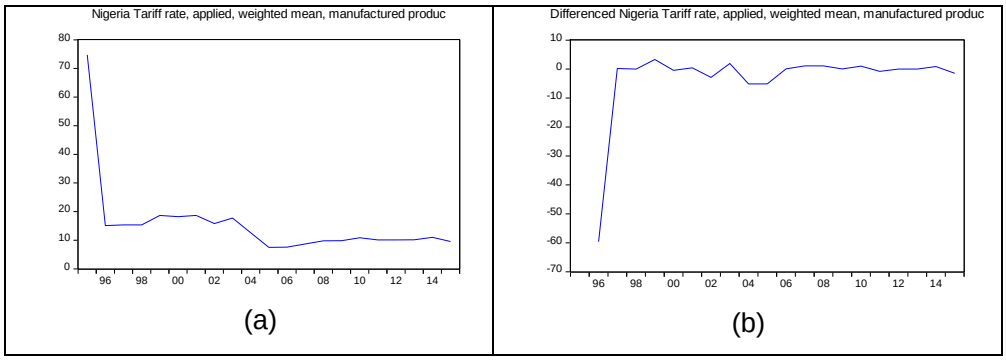
Trade openness (TRDOPN) in panel (a) shows an upward trend for most of the observation period for both countries. The evidence of trend disappears at first difference, in panel (b), with Nigeria approaching a mean of zero. Therefore, in panel(b) the data series for both countries seems more stationary.

Figure 4.4: Trade liberalisation

South Africa



Nigeria



Trade liberalisation (TRDLIB) at level, in panel(a), is nonstationary with a mean greater than zero for both countries. In Panel (b) the data series seems stationary at first difference with a mean of zero.

These observations in this section will be verified using the ADF and Phillips-Perron unit rot tests in Section 4.2.1.1

4.1.1 Unit rot test

Figure 4.5 and Figure 4.6 show summarised results from the Augmented Dickey Fuller (ADF) test and the Phillips – Perron (PP) tests for South Africa and Nigeria. The full tests are disclosed in Appendix A.

Table 4.1: South Africa Unit root tests

Variable	Intercept		Intercept and trend	
	Augmented Dickey–Fuller	Phillips – Perron	Augmented Dickey–Fuller	Phillips – Perron
GDP	-2.6504*	-2.6501*	-4.49830	-4.4983
FDI	-3.0655**	-3.8285***	-4.667883	-4.4987***
LTRDOPN	-3.808546	-3.8085	-4.4983	-4.4983
ΔLTRDOPN	-3.8315***	-3.8315***	-3.6736**	-4.5325***
TRDLIB	-3.8085***	-3.8085***	-4.4983***	-4.4983***

Note t-statistic have been used to indicate unit root, * denotes the rejection of the null hypothesis at 10%, ** denotes the rejection of the null hypothesis at 5%, *** denotes the rejection of the null hypothesis at 1%.

For both the ADF and PP unit roots tests performed on the South African data at intercept show that for all the variable except for LTRDOPN, the null hypothesis can be rejected at level. Therefore, LTRDOPN will be integrated at I (1) while FDI, GDPGWTH and TRDLIB will be integrated at I (0). At intercept and Trend, the data exhibits integration at I (0) and I (1). PPGRWTH is integrated at I(0) for both ADF and PP tests.

Table 4.2: Nigeria unit root tests

Variable	Intercept	Intercept and trend

	Augmented Dickey–Fuller	Phillips – Perron	Augmented Dickey–Fuller	Phillips – Perron
GDP	-3.8085**	-3.8085**	-3.6584**	-3.6584**
FDI	-3.808546 (0.4033)	-3.8085	-4.4983	-4.4983
ΔFDI	-3.8315***	-3.8315***	-4.5325***	-4.5325***
LTRDOPN	-3.8085	-3.8085	-3.2689**	-4.498307
ΔLTRDOPN	-3.8573***	-3.8315***	-4.5715***	-4.5325***
TRDLIB	-3.8085***	-3.8085***	-4.4983***	-4.4983***

Note t-statistic have been used to indicate unit root, * denotes the rejection of the null hypothesis at 10%, ** denotes the rejection of the null hypothesis at 5%, *** denotes the rejection of the null hypothesis at 1%.

For Nigeria, both the ADF and PP unit roots tests performed at intercept show that for GDPGRWTH, TRDLIB and POPGRWTH the null hypothesis can be rejected at level. Thus, at first difference FDI and TRDOPN become stationary.

In both countries variables are integrated at level and 1st difference, the ARDL can be used (Pesaran, et al., 2001).

4.1.2 ARDL Bounds test

To determine the existence of long run equations, the bounds F-test is applied using the Schwartz Bayesian criterion automatic lag selection. Table 4.3 and Table 4.4 show the results of the bounds test. The detailed results of the Bounds tests are presented in Appendix C.

Table 4.3: Bounds test

	Equation	F-statistic	Lower Bound I0 at 5%	Upper Bound I1 at 5%	Outcome
South Africa	GDP	8.061586	2.79	2.39	Cointegrated
Nigeria	GDP	4.06950	2.79	3.67	Cointegrated

Table 4.4: Critical Value Bound

	South Africa		Nigeria	
Significance	I0 Bound	I1 Bound	I0 Bound	I1 Bound
10%	2.37	3.2	2.37	3.2
5%	2.79	3.67	2.79	3.67
1%	3.65	4.66	3.65	4.66

The model has 5 independent variables, therefore k = 5. For South Africa, the F-statistic is 9.25269 which is greater that the lower and upper bounds critical values, of 3.06 and 4.15 respectively. Nigeria has a F-statistic of 4.817743 which is greater than the lower bound and upper bound. Both results are at a 1% significance level, therefore variables are cointegrated.

These findings provide enough evidence that a long run relationship exists between the variables and GDP growth in both countries. This paper proceeded to estimate long run cointegrating equation and specify the coefficients of the model.

Comment [NT1]: Good, you need to discuss further by comparing with literature those that have or contradicting

4.1.3 ARDL Long run

Comment [NT2]: Long run and short run are not clear at all

Table 4.5: ARDL long run Economic model.

Variable	Nigeria	South Africa
FDI	0.01411	0.004154
LTRDOPN	0.671117	0.56671
TRDLIB	-0.016449	-0.053479
C	-1.653587	-0.646334

Table 4.5 shows the summarised results off the long run ARDL for the GDP growth model for South Africa and Nigeria with the detailed results presented Appendix C. For South Africa, FDI coefficient is 0.004154 shows that there is a positive non-significant long run relationship between FDI add economic growth. This implies that at a 10% increase in FDI will lead to increase in the level of economic growth growth by 0.04%. In Nigeria, the same relationship is evident whereby a 10% increase in FDI will in 0.14% improvement in economic growth. This suggests that over the observation period Nigeria was able to leverage on FDI inflows better than South Africa.

The non-significant negative impact of FDI on Economic growth in Nigeria is consistent with findings by Akanegbu & Chizea (2017) and Akinlo (2004). In their study Akanegbu & Chizea (2017) found that for the period 1991 to 2014 not only was the effect of FDI on economic growth positive but the FDI- growth leakages were also positive. Contradictory studies for Nigeria are Uwubanmwen and Ogiemudia (2016), Adelegan (2000).For South Africa the findings are similar in that in the long run the effect of FDI on economic growth is small and negative (Strauss, 2015). This was mainly due to the fact that FDI during the observed period was by large limted to mining sector which has a weak linkage to the rest of the economy.

Log of trade openness in South Africa with an elasticity of 0.56671 which indicates a positive long run relationship between Log of trade openness and economic growth. This implies that a 10% increase in Trade openness will lead

to a 5.67% impprovement in economic growth. For Nigeria, Trade openness has an elasticcity of 0.671117 indicating a negative long run relationship. These results shhould that a 10% increase in Trade openness will result in a 6.71% improvement of GDP. They are both significant at 1%.

This positive relationship between Trade openness and economic growth that is found in both countries is consistent with descriptive and econometric analysis. Sikwila, Ruvimbo and Mosikari (2014) noted that over the period of 1994 to 2013, there is a positive relationship between Trade openness and economic growth. For Nigeria, Olowe and Ibraheem (2015) found through descriptive analysis that trade openness has a positive relatioonship with economic growth.

Trade liberalisation in Nigeria indicates a negative relationship with economic growth, with a 10% increase in trade liberalization will result in a 0.16%. For South Africa, trade liberalization has a positive relationship with economic growth of 0.016226. This implies that a 10% increase in trade liberalization will result in 0.53% increase in economic growth.

The significant negative effect of trade liberalization on economic growth in Nigeria is contradictory with findings by Okoye, et al. (2016) that focused on the period 1986 to 2015. They found that although positive but they were very insignifant. For South Africa, the negative Manwa (2015) also found a significant negative effect to economic growth.

4.1.4 ARDL Error correction model

Table 4.6: ARDL Error Correction Model: South Africa

Variable	Coefficient	t-statistic	Probability Value
ΔFDI t-2	-0.001637	-2.651738	0.0453
ΔLTRDOPN t-1	-0.112906	-2.237328	0.0755
ΔTRDLIB t-2	0.003660	3.846169	0.0120
ΔECT t	-0.181562	-2.271450	0.0723

Table 4.7: ARDL Error Correction Model: Nigeria

Variable	Coefficient	t-statistic	Probability Value
FDI_t	-0.012170	-1.951537	0.0795
$\Delta LTRDOPN_{t-2}$	-0.186817	-2.030837	0.0697
$TRDLIB_t$	-0.014186	-3.478807	0.0059
ΔECT_t	-0.862438	-3.287598	0.0082

Source:

Table 4.6 and 4.7 presents the short run parameters of the Economic growth model. The detailed results for the ARDL short run model are presented in Appendix D. The South African model shows that all variables are statistically significant. In short run, the results show that economic growth is negatively related to the 2year lag of FDI and trade openness. At a 10% significance level, the 1-year lag of current trade liberalisation on economic growth suggests that the positive effect of trade liberalization on economic growth will be evident after 1 year. For Nigeria the results show that economic growth is negatively related to 2 years lad of trade openness. There is no lag between FDI and trade liberalization.

FDI for South Africa coefficient is -0.001637 which indicates that a 10% increase in FDI will result in 0.01637% deterioration in economic growth in the short run. For Nigeria, a 10% increase in FDI will lead to a 0.1217% deterioration in GDP.

The trade openness elasticity is at -0.112906 for South Africa and -0.186817 for Nigeria. This means that a 10% increase in trade openness will lead to 1.12% and 0.16% deterioration in economic growth. This negative effect for South Africa is confirmed by Malefane & Odhiambo (2018). For Nigeria these findings are in line with the findings of (Olowe & Ibraheem (2015). Trade openness has a larger effect n economic growth in South Africa than Nigeria.

Trade liberalisation for South Africa is at 0.003660, which means that with a 10% increase economic growth will improve by 0.036%. Nigeria's trade liberalisation variable has a coefficient of -0.0141. This suggests that a 10% increase in trade liberalisation will result in a 0.14% deterioration in economic

growth in the short run. For this outcome trade liberalisation has a larger, although negative, effect on economic growth compared to South Africa.

The error correction term measures the speed at which variables converge to equilibrium has a magnitude of -0.181562 for South Africa and -0.862438 for Nigeria. These show that for South Africa, about 18% of the disequilibrium in the current year will be corrected in the next year. For Nigeria, about 86% of the disequilibrium will be correct in the next year. This outcome shows that Nigeria's is more responsive to trade liberalisation thank South Africa's

4.1.5 Diagnostic and Stability tests results

Table 4.8: South Africa Diagnostic tests

	H0	F-statistic	P-value	Conclusions
Breusch-Pagan-Godfrey	No Heteroskedasticity	0.587232	0.6769	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore there is no Heteroscedasticity in the model.
Harvey	No Heteroskedasticity	1.208383	0.3480	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore there is no Heteroscedasticity in the model.
Glejser	No Heteroskedasticity	0.458878	0.7647	Do not reject Ho as PV is greater than the L.O.S at

				5%, therefore there is no Heteroscedasticity in the model.
Jarque-Bera	Residuals are not normally distributed	3.646278	0.161518	Accept Ho as PV is greater than the L.O.S at 5%, therefore the residuals of the model are normally distributed
Ljung-Box Q	No Autocorrelation	15.365	0.222	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore the model does not suffer from autocorrelation.
Lagrange Multiplier Test	No Serial correlation	1.542175	0.2506	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore, therefore there is no serial correlation in the model

Table 4.9: Nigeria Diagnostic tests

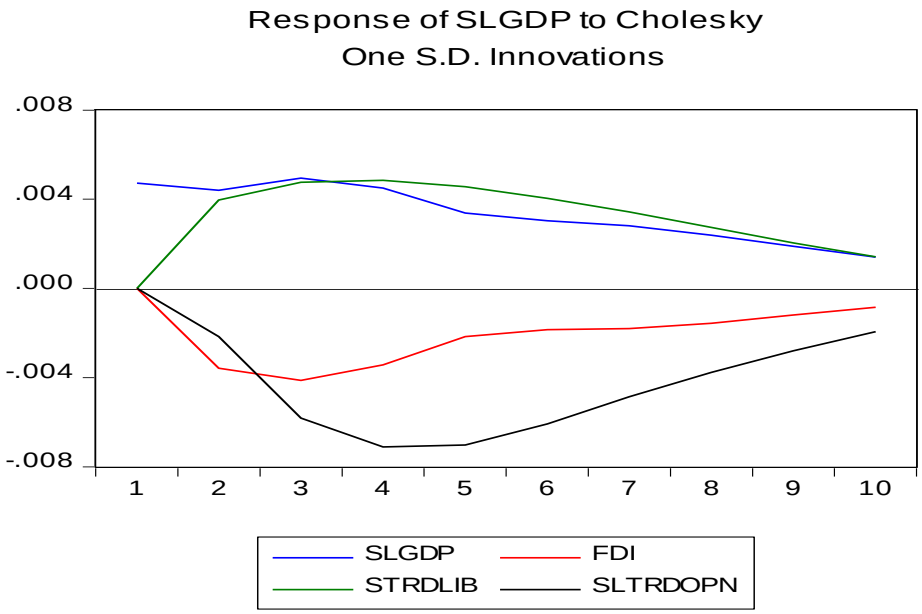
	H0	F-statistic	P-value	Conclusions
Breusch-Pagan-Godfrey	No Heteroskedasticity	3.672095	0.0248	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore there is no Heteroscedasticity in the model.
Harvey	No Heteroskedasticity	0.645154	0.6697	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore there is no Heteroscedasticity in the model.
Glejser	No Heteroskedasticity	1.864394	0.1648	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore there is no Heteroscedasticity in the model.
Jarque-Bera	Residuals are not normally distributed	0.720093	0.6976	Accept Ho as PV is greater than the L.O.S at 5%, therefore the residuals of the model are normally

				distributed
Ljung-Box Q	No Autocorrelation	11.038	0.750	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore the model does not suffer from autocorrelation.
Lagrange Multiplier Test	No Serial correlation	1.785849	0.2094	Do not reject Ho as PV is greater than the L.O.S at 5%, therefore, therefore there is no serial correlation in the model

The Tables 4.8 and 4.9 above report the residual diagnostics of the GDP model. Detailed results for all the stability and diagnostic tests are presented in Appendix E. To test for heteroscedasticity the Breusch-Pagan-Godfrey, Harvey and Glejser test were used. The null hypothesis of no heteroscedasticity is not rejected as the p-values are greater than the respective levels of significance at 5% for the tests. The residuals are normally distributed in the model as evidenced by the non-rejection of the null hypothesis using the Jarque-Bera test. The Ljung-Box Q statistic also reports that there is no auto correlation in the model, thus not rejecting the null hypothesis. The Lagrange Multiplier serial correlation test also confirms that there is no serial correlation in the model, therefore not rejecting the null hypothesis

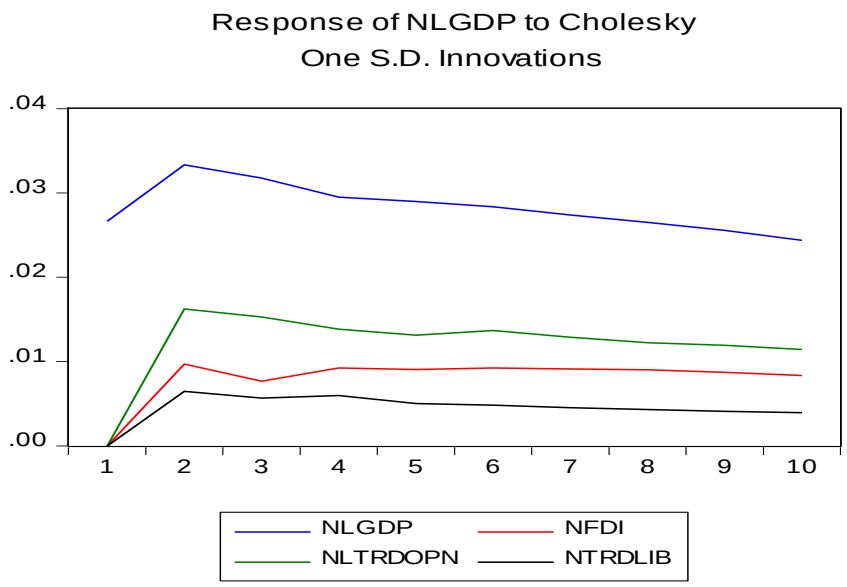
4.1.4 Impulse Response Test

Figure 4.5: Impulse Response Graph – South Africa



The response of economic growth to FDI, in figure 4.5, is negative across the observation period showing a steep decline until the fourth year when it starts to recover but remains negatives. Similarly, the response of economic growth to trade openness follows the same negative trend with a shorter period of deterioration than FDI while remaining negative. The response of economic growth to trade liberalisation is positive across the period, increasing in the first few years then showing a slight decline thereafter while remining positive.

Figure 4.6: Impulse response graph - Nigeria



Response of NLTRDOPN to Cholesky
One S.D. Innovations

The response of economic growth to all the variables, in figure 4.5, is positive with an initial incline in the first two year thereafter becoming steady across the observation period.

4.1.5 Variance decomposition

Table 4.10 and 4.11 show output of variance decomposition with normalisation on economic growth for South Africa and Nigeria. For South Africa, the economic growth in the fourth year indicates that 30.9% of forecast error variance is due to its own innovation and 22.6% due to trade liberalisation, 14.9% by FDI and 31.9% by trade openness. By the ninth year, 23.6% of the one-step forecast variance in GDP is accounted for by its own innovations while variations in trade liberalisation rise to 23.3%, FDI to 10.9% and trade openness at 42.16%.

Table 4.10: Variance decomposition tables- South Africa

Variance Decomposition of SLGDP:					
Period	S.E.	SLGDP	FDI	STRDLIB	SLTRDOPN
1	0.004719	100.0000	0.000000	0.000000	0.000000
2	0.008652	55.59465	17.17964	20.96498	6.260724
3	0.013145	38.23306	17.28095	22.21064	22.27534
4	0.016702	30.93901	14.94055	22.16631	31.95412
5	0.019113	26.76603	12.69129	22.61554	37.92714
6	0.020767	24.80929	11.54185	22.95271	40.69614
7	0.021859	24.04130	11.10131	23.17607	41.68132
8	0.022530	23.75050	10.93045	23.28522	42.03383
9	0.022904	23.66319	10.85080	23.31925	42.16676
10	0.023088	23.66055	10.81150	23.32709	42.20086

Table 4.11 shows that the economic growth indicates that 78% of forecast error variance is due to its own innovation, in the fourth year, and 14.5% from trade liberalisation, 5% from FDI and 2.3% trade openness. In ninth year, the economic growth indicates that 75% of forecast error variance is accounted for by its own innovations while variations in trade liberalisation, FDI and trade openness rose to 14%, 6% and 2% respectively.

Table 4.11: Variance decomposition tables- Nigeria

Variance Decomposition of NLGDP:					
Period	S.E.	NLGDP	NFDI	NLTRDOPN	NTRDLIB
1	0.026644	100.0000	0.000000	0.000000	0.000000
2	0.047113	82.01872	4.225343	11.88397	1.871973
3	0.059599	79.63882	4.293997	13.99217	2.075006
4	0.068807	78.12929	5.018225	14.54466	2.307817
5	0.076509	77.54157	5.455060	14.70818	2.295196
6	0.083391	76.84600	5.822845	15.06610	2.265059
7	0.089288	76.42604	6.122054	15.21971	2.232200
8	0.094465	76.14329	6.381225	15.27506	2.200418
9	0.099052	75.91031	6.578846	15.33948	2.171366
10	0.103058	75.71427	6.733431	15.40169	2.150618

4.1.6 Ramsey RESET test results

Table 4.12: Ramsey RESET test

Test- Nigeria		t-statistic		
Ramsey RESET	The Model is correctly specified	1.822537	0.0914	Do not reject H0 because the P-value

Table4.10 shows the results of the Ramsey RESET test, the full results are in Appendix H. The null hypothesis states that the model is correctly specified. Since the p-value is greater than the 5% level of significance, the null hypothesis is not rejected. Therefore, the model is correctly specified.

4.1.7 Stability tests results

Figure 4.7: South Africa- CUSUM and CUSUM of Squares

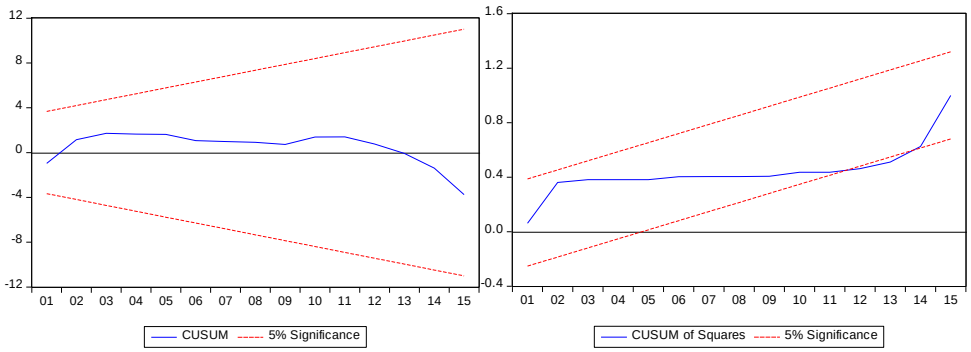
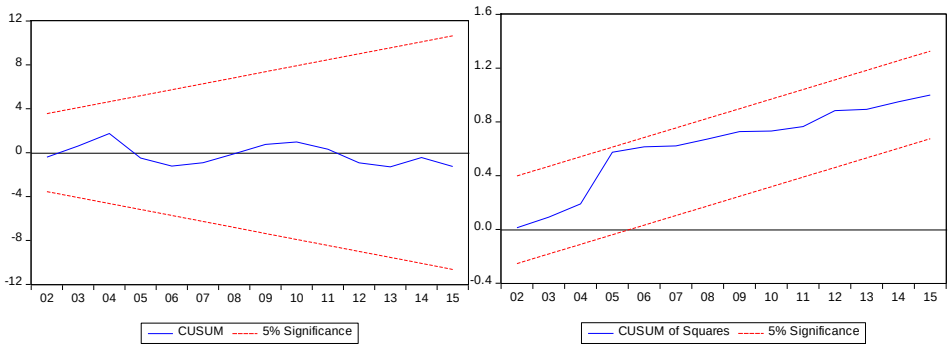


Figure 4.8: Nigeria- CUSUM and CUSUM of Squares



To test stability of the model CUSUM and CUSUM of Squares tests were conducted. The results from the CUSUM test in figure 4.5-4.6 show that for both South Africa and Nigeria there was stability in the model across the observation period. The CUSUM of squares shows that the model is stable as it lies between the critical lines at a 5 % significance level. Thus, the models are considered stable.

4.2 Summary

This applied the methodology suggested in chapter 3 to critically analysis the data set. The time series characteristics of the data were discussed first to

visually check if the variables are stationary before proceeding with the ADF and Phillips - Perron unit root tests. Due to the nature on integration found through the unit root test, the ARDL Bounds test was employed to test for a cointegration. The ARDL method was also employed for the long run as well as the short run economic growth models. Stability and Diagnostic tests concluded the chapter.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, CONCLUSION

5.1 Summary and Interpretation of Findings

This dissertation has analysed and compared the effect of trade liberalization on economic growth for South Africa and Nigeria for the 1981-2015. Theoretical and empirical literature showed that trade liberalization to have positive relationship with economic growth, with countries that able to adapt to changes in technology. The unit root tests found that the variables were integrated at different levels therefore the auto-regressive distributed lag (ARDL) approach was used to achieve the stated objectives of this dissertation.

The results from the ARDL bounds test showed that a long run cointegrating relationship between the variables in the economic growth model. The ARDL long run equation showed that FDI has a negative effect on economic growth for Nigeria and for South Africa the effect was positive but insignificant. Trade openness has a positive relationship with economic growth in both South Africa and Nigeria. Trade liberalization had a positive effect on economic growth for South Africa but for Nigeria it had a negative and highly significant effect. The error correct model showed that Nigeria (86%) converge faster to equilibrium than South Africa (18%) during the observation period.

The Impulse response function for South Africa showed that economic growth responded negatively to shocks in FDI and trade openness whereas for Nigeria economic growth responded positively to all variable. Variance decomposition showed that trade openness accounted for up to 42% in the economic growth forecast error variance. For Nigeria the variables accounted for a small amount of the forecast error variance in economic growth, suggesting that economic could influence by other variables not accounted for in the model. The diagnostic tests found that there was no heteroscedasticity, no serial correlation and the model is normally distributed. The CUSUM and CUSUM of Squares test showed that the models where stable throughout the observation period.

5.2 Recommendations of the study

This study adds to growing research around trade and how it can be used to grow African economies. By focusing on South Africa and Nigeria, this study can provide insights on how they can better leverage trade to grow their economies and provide insights on linkages in the economy.

This study recommends that both countries focus on strategic trade policy that are better fitted for their economies. In the case of South Africa, it recommended that trade policy be focused around boosting FDI and trade openness. Both countries are resource rich and should have more economic policy that will allow for more trade that will improve the economy.

5.3 Limitations of the study

This study focused on trade of goods, services and manufactured goods. By only focusing on these as proxies of trade, this study has not been able to comprehensively look at the effect that other sectors have on trade in the individual countries. This has created the limitation to the study and thus recommend that the study be explored further with focus on more sectors of the economy.

5.4 Areas of future research

This study focused predominately on trade effects on economic growth. Based on the current limitations to this study, future research will focus on expanding on its findings a study that focus on key economic industries of each of the countries would add more insight on effects of trade liberalisation on economic growth.

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Appendix A: Data

South Africa

YEAR	STRDLIB	SGDP	SLGDP	SFDI	SLTRDOPN
1995	14,09	5948,76	3,774426	0,803051	7,306506
1996	8,84	6068,019	3,783047	0,553079	7,330691
1997	6,3	6084,949	3,784257	2,497308	7,352048
1998	5,7	5973,272	3,776212	0,399448	7,371733
1999	5,1	5970,738	3,776028	1,100279	7,359372
2000	5,53	6069,292	3,783138	0,710486	7,382113
2001	5,88	6106,897	3,785821	5,983041	7,386085
2002	5,15	6257,859	3,796426	1,281412	7,387012
2003	5,4	6360,408	3,803485	0,44685	7,394087
2004	6,47	6563,539	3,817138	0,306842	7,414468
2005	6,65	6817,959	3,833654	2,530173	7,437776
2006	6,49	7100,86	3,851311	0,229456	7,470725
2007	5,99	7377,568	3,867913	2,199885	7,489802
2008	4,94	7504,972	3,875349	3,447016	7,491626
2009	5,49	7282,481	3,862279	2,576394	7,422036
2010	5,7	7392,868	3,868813	0,983956	7,453725
2011	5,46	7520,406	3,876241	0,994021	7,478153
2012	5,32	7568,455	3,879007	1,16718	7,486262
2013	5,21	7623,127	3,882133	2,239571	7,501616
2014	5,13	7623,128	3,882133	1,648613	7,507274
2015	5,22	7593,358	3,880434	0,483559	7,529029

Nigeria

NYEAR	NTRDLIB	NGDP	NLGDP	NLTRDOPN	NFDI
1995	74,74	1238	3,092721	0,4903407	3,780688
1996	15,13	1267,786	3,103046	0,4917882	4,554308
1997	15,34	1271,176	3,104206	0,4919505	4,297446
1998	15,34	1273,455	3,104983	0,4920593	3,284921
1999	18,65	1247,828	3,096155	0,4908227	2,80149
2000	18,24	1281,563	3,10774	0,4924447	2,457934
2001	18,67	1304,771	3,115534	0,4935325	2,697522

2002	15,82	1320,296	3,120671	0,494248	3,170064
2003	17,77	1420,349	3,152395	0,4986407	2,964106
2004	12,645	1851,315	3,26748	0,514213	2,13333
2005	7,52	1866,007	3,270913	0,514669	4,438848
2006	7,6	1967	3,293804	0,5176978	3,33798
2007	8,695	2046,558	3,311024	0,5199623	3,62567
2008	9,79	2117,844	3,325894	0,5219084	3,93945
2009	9,85	2205,004	3,343409	0,5241896	5,04766
2010	10,87	2314,964	3,364544	0,5269262	1,641453
2011	10,11	2363,671	3,373587	0,5280919	2,16319
2012	10,12	2399,335	3,380091	0,5289284	1,546824
2013	10,13	2461,804	3,391254	0,5303603	1,093554
2014	11,01	2548,427	3,406272	0,5322793	0,851655
2015	9,57	2548,174	3,406229	0,5322738	0,642695

Appendix B: Unit root tests

Augmented Dickey-Fuller test

South Africa

Null Hypothesis: SLGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.199387	0.4632
Test critical values:	1% level	-4.532598	
	5% level	-3.673616	
	10% level	-3.277364	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SLGDP)
Method: Least Squares
Sample (adjusted): 1997 2015
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SLGDP (-1)	-0.304209	0.138315	-2.199387	0.0439
D (SLGDP (-1))	0.585833	0.217052	2.699044	0.0165

C		1.143568	0.518468	2.205669	0.0434
@TREND ("1995")		0.002144	0.001043	2.056349	0.0576

R-squared	0.384085	Mean dependent var	0.005126
Adjusted R-squared	0.260901	S.D. dependent var	0.008090
S.E. of regression	0.006955	Akaike info criterion	-6.914117
Sum squared resid	0.000726	Schwarz criterion	-6.715287
Log likelihood	69.68411	Hannan-Quinn criter.	-6.880467
F-statistic	3.117998	Durbin-Watson stat	2.055340
Prob(F-statistic)	0.057667		

Null Hypothesis: STRDLIB has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.41342	0.0000
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(STRDLIB)
Method: Least Squares
Sample (adjusted): 1996 2015
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STRDLIB (-1)	-0.626650	0.050482	-12.41342	0.0000
C	3.468049	0.330721	10.48632	0.0000

R-squared	0.895405	Mean dependent var	-0.443500
Adjusted R-squared	0.889595	S.D. dependent var	1.351585
S.E. of regression	0.449095	Akaike info criterion	1.331477
Sum squared resid	3.630361	Schwarz criterion	1.431050
Log likelihood	-11.31477	Hannan-Quinn criter.	1.350915
F-statistic	154.0929	Durbin-Watson stat	1.399256
Prob(F-statistic)	0.000000		

Null Hypothesis: FDI has a unit root
Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.549704	0.0203
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

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

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 16

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Sample (adjusted): 2000 2015
Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI (-1)	-2.815432	0.793146	-3.549704	0.0053
D (FDI (-1))	1.648753	0.675623	2.440344	0.0348
D (FDI (-2))	1.125993	0.521363	2.159709	0.0561
D (FDI (-3))	0.553455	0.375161	1.475249	0.1709
D (FDI (-4))	0.538109	0.238873	2.252700	0.0480
C	4.722968	1.360979	3.470272	0.0060
				-0.038545
R-squared	0.786917	Mean dependent var		

Adjusted R-squared	0.680375	S.D. dependent var	2.200066
S.E. of regression	1.243815	Akaike info criterion	3.554240
Sum squared resid	15.47076	Schwarz criterion	3.843961
Log likelihood	-22.43392	Hannan-Quinn criter.	3.569076
F-statistic	7.386014	Durbin-Watson stat	2.297627
Prob(F-statistic)	0.003845		

Null Hypothesis: D(SLTRDOPN) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.394655	0.0031
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(SLTRDOPN,2)

Method: Least Squares

Sample (adjusted): 1997 2015

Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (SLTRDOPN (-1))	-1.060405	0.241294	-4.394655	0.0004
C	0.011077	0.005899	1.877949	0.0777

R-squared	0.531848	Mean dependent var	-0.000128
Adjusted R-squared	0.504310	S.D. dependent var	0.032931
S.E. of regression	0.023185	Akaike info criterion	-4.591321
Sum squared resid	0.009138	Schwarz criterion	-4.491907
Log likelihood	45.61755	Hannan-Quinn criter.	-4.574497
F-statistic	19.31299	Durbin-Watson stat	2.031929
Prob(F-statistic)	0.000396		

Nigeria

Null Hypothesis: D(NLGDP) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.922263	0.0058
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NLGDP,2)

Method: Least Squares

Sample (adjusted): 1997 2015

Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (NLGDP (-1))	-0.640375	0.219137	-2.922263	0.0091

R-squared	0.321591	Mean dependent var	-0.000546
Adjusted R-squared	0.321591	S.D. dependent var	0.034628
S.E. of regression	0.028521	Akaike info criterion	-4.22512

			3
			-4.17541
Sum squared resid	0.014643	Schwarz criterion	6
			-4.21671
Log likelihood	41.13867	Hannan-Quinn criter.	1
Durbin-Watson stat	2.136260		

Null Hypothesis: NTRDLIB has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-15.42533	0.0000
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(NTRDLIB)

Method: Least Squares

Sample (adjusted): 1996 2015

Included observations: 20 after adjustments

Variable	Coefficien	Std. Error	t-Statistic	Prob.

	t			
NTRDLIB (-1)	-0.901945	0.058472	-15.42533	0.0000
C	11.08423	1.238306	8.951123	0.0000
R-squared	0.929671	Mean dependent var		-3.258500
Adjusted R-squared	0.925764	S.D. dependent var		13.42362
S.E. of regression	3.657437	Akaike info criterion		5.526042
Sum squared resid	240.7832	Schwarz criterion		5.625615
Log likelihood	-53.26042	Hannan-Quinn criter.		5.545479
F-statistic	237.9408	Durbin-Watson stat		0.493066
Prob(F-statistic)	0.000000			

Null Hypothesis: D(NFDI) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.563154	0.0000
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NFDI,2)
Method: Least Squares
Sample (adjusted): 1997 2015
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (NFDI (-1))	-1.414060	0.215454	-6.563154	0.0000
C	-0.269706	0.239664	-1.125351	0.2761

R-squared	0.717020	Mean dependent var	-0.051715
Adjusted R-squared	0.700374	S.D. dependent var	1.890073
S.E. of regression	1.034589	Akaike info criterion	3.005186
Sum squared resid	18.19636	Schwarz criterion	3.104601
Log likelihood	-26.54927	Hannan-Quinn criter.	3.022011
F-statistic	43.07499	Durbin-Watson stat	2.158902
Prob(F-statistic)	0.000005		

Phillips- Perron test

South Africa

Null Hypothesis: D(SLGDP) has a unit root

Exogenous: None

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.193648	0.0306
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Residual variance (no correction)	5.52E-05
HAC corrected variance (Bartlett kernel)	5.52E-05

Phillips-Perron Test Equation

Dependent Variable: D(SLGDP,2)

Method: Least Squares

Sample (adjusted): 1997 2015

Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (SLGDP (-1))	-0.400368	0.182512	-2.193648	0.0416

R-squared	0.207602	Mean dependent var	-0.000543
Adjusted R-squared	0.207602	S.D. dependent var	0.008574
S.E. of regression	0.007632	Akaike info criterion	-6.861762
Sum squared resid	0.001048	Schwarz criterion	-6.812055
Log likelihood	66.18674	Hannan-Quinn criter.	-6.853350
Durbin-Watson stat	1.936413		

Null Hypothesis: STRDLIB has a unit root

Exogenous: Constant

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.41342	0.0000
Test critical	1% level	-3.808546	

values:

	5% level	-3.020686
	10% level	-2.650413

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

Residual variance (no correction)	0.181518
HAC corrected variance (Bartlett kernel)	0.181518

Phillips-Perron Test Equation
Dependent Variable: D(STRDLIB)
Method: Least Squares
Sample (adjusted): 1996 2015
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STRDLIB (-1)	-0.626650	0.050482	-12.41342	0.0000
C	3.468049	0.330721	10.48632	0.0000

R-squared	0.895405	Mean dependent var	-0.443500
Adjusted R-squared	0.889595	S.D. dependent var	1.351585
S.E. of regression	0.449095	Akaike info criterion	1.331477
Sum squared resid	3.630361	Schwarz criterion	1.431050

			1.35091
Log likelihood	-11.31477	Hannan-Quinn criter.	5
			1.39925
F-statistic	154.0929	Durbin-Watson stat	6
Prob(F-statistic)	0.000000		

Null Hypothesis: FDI has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.147236	0.0004
Test critical			
values:	1% level	-4.498307	
	5% level	-3.658446	
	10% level	-3.268973	

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

	1.812941
Residual variance (no correction)	
	0.369350
HAC corrected variance (Bartlett kernel)	

Phillips-Perron Test Equation

Dependent Variable: D(FDI)

Method: Least Squares

Sample (adjusted): 1996 2015

Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI (-1)	-1.117944	0.244607	-4.570365	0.0003
C	1.757756	0.751044	2.340417	0.0317
@TREND ("1995")	0.001949	0.057028	0.034171	0.9731

R-squared	0.554329	Mean dependent var	-0.015975
Adjusted R-squared	0.501897	S.D. dependent var	2.069296
S.E. of regression	1.460435	Akaike info criterion	3.732827
Sum squared resid	36.25881	Schwarz criterion	3.882187
Log likelihood	-34.32827	Hannan-Quinn criter.	3.761984
F-statistic	10.57235	Durbin-Watson stat	2.038139
Prob(F-statistic)	0.001039		

Null Hypothesis: D(SLTRDOPN) has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.051418	0.0008
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	

10% level	-2.655194

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

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Residual variance (no correction)	0.000481
HAC corrected variance (Bartlett kernel)	0.000168

Phillips-Perron Test Equation
Dependent Variable: D(SLTRDOPN,2)
Method: Least Squares
Sample (adjusted): 1997 2015
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (SLTRDOPN (-1))	-1.060405	0.241294	-4.394655	0.0004
C	0.011077	0.005899	1.877949	0.0777

R-squared	0.531848	Mean dependent var	-0.000128
Adjusted R-squared	0.504310	S.D. dependent var	0.032931
S.E. of regression	0.023185	Akaike info criterion	-4.59132

			1
			-4.491907
Sum squared resid	0.009138	Schwarz criterion	
			-4.574497
Log likelihood	45.61755	Hannan-Quinn criter.	
			2.031929
F-statistic	19.31299	Durbin-Watson stat	
Prob(F-statistic)	0.000396		

Nigeria

Null Hypothesis: D(NLGDP) has a unit root

Exogenous: None

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.883515	0.0064
Test critical values:	1% level	-2.692358	
	5% level	-1.960171	
	10% level	-1.607051	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Residual variance (no correction)	0.000771
HAC corrected variance (Bartlett kernel)	0.000717

Phillips-Perron Test Equation
Dependent Variable: D(NLGDP,2)
Method: Least Squares
Sample (adjusted): 1997 2015
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (NLGDP (-1))	-0.640375	0.219137	-2.922263	0.0091

R-squared	0.321591	Mean dependent var	-0.000546
Adjusted R-squared	0.321591	S.D. dependent var	0.034628
S.E. of regression	0.028521	Akaike info criterion	-4.225123
Sum squared resid	0.014643	Schwarz criterion	-4.175416
Log likelihood	41.13867	Hannan-Quinn criter.	-4.216711
Durbin-Watson stat	2.136260		

Null Hypothesis: NTRDLIB has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.899263	0.0000
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

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

Residual variance (no correction)	12.03916
HAC corrected variance (Bartlett kernel)	33.00870

Phillips-Perron Test Equation

Dependent Variable: D(NTRDLIB)

Method: Least Squares

Sample (adjusted): 1996 2015

Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NTRDLIB (-1)	-0.901945	0.058472	-15.42533	0.0000
C	11.08423	1.238306	8.951123	0.0000

			-3.258500
R-squared	0.929671	Mean dependent var	
Adjusted R-squared	0.925764	S.D. dependent var	13.42362
			5.526042
S.E. of regression	3.657437	Akaike info criterion	
			5.625615
Sum squared resid	240.7832	Schwarz criterion	
			5.545479
Log likelihood	-53.26042	Hannan-Quinn criter.	
			0.493066
F-statistic	237.9408	Durbin-Watson stat	
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NFDI) has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.829057	0.0000
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Residual variance (no correction)	0.957703
HAC corrected variance (Bartlett kernel)	0.801504

Phillips-Perron Test Equation
Dependent Variable: D(NFDI,2)
Method: Least Squares
Sample (adjusted): 1997 2015
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (NFDI (-1))	-1.414060	0.215454	-6.563154	0.0000
C	-0.269706	0.239664	-1.125351	0.2761

R-squared	0.717020	Mean dependent var	-0.051715
Adjusted R-squared	0.700374	S.D. dependent var	1.890073
S.E. of regression	1.034589	Akaike info criterion	3.005186
Sum squared resid	18.19636	Schwarz criterion	3.104601
Log likelihood	-26.54927	Hannan-Quinn criter.	3.022011
F-statistic	43.07499	Durbin-Watson stat	2.158902

Prob(F-statistic) 0.000005

Null Hypothesis: D(NLTRDOPN) has a unit root

Exogenous: Constant

Bandwidth: 18 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.199457	0.0000
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

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

Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 19

Residual variance (no correction)	0.006534
HAC corrected variance (Bartlett kernel)	0.001386

Phillips-Perron Test Equation

Dependent Variable: D(NLTRDOPN,2)

Method: Least Squares

Sample (adjusted): 1997 2015

Included observations: 19 after adjustments

Variable	Coefficien	Std. Error	t-Statistic	Prob.

	t			
D (NLTRDOPN (-1))	-1.279163	0.235089	-5.441185	0.0000
C	0.017804	0.019935	0.893098	0.3843
				-0.001846
R-squared	0.635244	Mean dependent var		
Adjusted R-squared	0.613788	S.D. dependent var		0.137510
				-1.982311
S.E. of regression	0.085457	Akaike info criterion		
				-1.882896
Sum squared resid	0.124149	Schwarz criterion		
				-1.965486
Log likelihood	20.83195	Hannan-Quinn criter.		
				2.039079
F-statistic	29.60650	Durbin-Watson stat		
Prob(F-statistic)	0.000044			

Appendix C: ARDL Bounds test

South Africa

ARDL Cointegrating Form and Bounds Test
Original dep. variable: SLGDP
Selected Model: ARDL (1, 0, 0, 0)
Sample: 1995 2015
Included observations: 20

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.665048	0.201762	-3.296200	0.0049
SLGDP(-1)	-0.278996	0.074372	-3.751338	0.0019
STRDLIB*	0.004527	0.001659	2.728766	0.0155
FDI*	-9.37E-05	0.000940	-0.099726	0.9219
SLTRDOPN*	0.230377	0.054974	4.190660	0.0008

* Note: variable interpreted as Z = Z(-1) + D(Z)

Bounds Test	Null Hypothesis: No cointegrating relationships exist			
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	8.061586	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
EC = SLGDP - (0.0162*STRDLIB -0.0003*FDI + 0.8257*SLTRDOPN -2.3837)				

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STRDLIB	0.016226	0.007355	2.206065	0.0434
FDI	-0.000336	0.003374	-0.099520	0.9220
SLTRDOPN	0.825737	0.096739	8.535676	0.0000
C	-2.383719	0.742546	-3.210198	0.0058

Nigeria

ARDL Cointegrating Form and Bounds Test
Original dep. variable: NLGDP
Selected Model: ARDL(1, 0, 0, 1)
Sample: 1995 2015
Included observations: 20

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.413216	0.603113	0.685139	0.5044
NLGDP(-1)	-0.398947	0.147716	-2.700769	0.0172
NTRDLIB*	-0.008761	0.003213	-2.726836	0.0164
NFDI*	-0.011320	0.005762	-1.964459	0.0696
NLTRDOPN(-1)	0.134878	0.103595	1.301971	0.2139
D(NLTRDOPN)	-0.040726	0.082370	-0.494427	0.6287

* Note: variable interpreted as Z = Z(-1) + D(Z)

Bounds Test	Null Hypothesis: No cointegrating relationships exist			
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.069520	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

EC = NLGDP - (-0.0220*NTRDLIB -0.0284*NFDI + 0.3381*NLTRDOPN + 1.0358)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NTRDLIB	-0.021959	0.004645	-4.727811	0.0003
NFDI	-0.028375	0.011857	-2.393039	0.0313
NLTRDOPN	0.338084	0.196278	1.722478	0.1070

C	1.035767	1.574963	0.657645	0.5214

Appendix D: ARDL Error Correction test

South Africa

ARDL Cointegrating And Long Run Form
Dependent Variable: SLGDP
Selected Model: ARDL(1, 3, 2, 3)
Date: 10/20/18 Time: 14:40
Sample: 1995 2015
Included observations: 18

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	-0.000191	0.000642	-0.297750	0.7779
D(FDI(-1))	-0.000357	0.000646	-0.552714	0.6043
D(FDI(-2))	-0.001637	0.000617	-2.651738	0.0453
D(SLTRDOPN)	0.073020	0.046886	1.557395	0.1801
D(SLTRDOPN(-1))	-0.112906	0.050465	-2.237328	0.0755
D(STRDLIB)	-0.000691	0.001917	-0.360288	0.7334
D(STRDLIB(-1))	-0.003552	0.002430	-1.461962	0.2036
D(STRDLIB(-2))	0.003660	0.000951	3.846169	0.0120
CointEq(-1)	-0.181562	0.079932	-2.271450	0.0723

Cointeq = SLGDP - (0.0042*FDI + 0.5668*SLTRDOPN + 0.0535*STRDLIB
-0.6463)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.004154	0.010161	0.408788	0.6996
SLTRDOPN	0.566771	0.152767	3.710023	0.0139
STRDLIB	0.053479	0.023442	2.281355	0.0714
C	-0.646334	1.070764	-0.603620	0.5724

Nigeria

ARDL Cointegrating And Long Run Form
Dependent Variable: NLGDP
Selected Model: ARDL(1, 0, 3, 0)
Date: 10/20/18 Time: 14:30
Sample: 1995 2015
Included observations: 18

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NFDI)	-0.012170	0.006236	-1.951537	0.0795
D(NLTRDOPN)	0.017033	0.099204	0.171698	0.8671
D(NLTRDOPN(-1))	-0.109627	0.098826	-1.109296	0.2933

D(NLTRDOPN(-2))	-0.186817	0.091990	-2.030837	0.0697
D(NTRDLIB)	-0.014186	0.004078	-3.478807	0.0059
CointEq(-1)	-0.862438	0.262331	-3.287598	0.0082

Cointeq = NLGDP - (-0.0141*NFDI + 0.6711*NLTRDOPN - 0.0164
*NTRDLIB -1.6536)

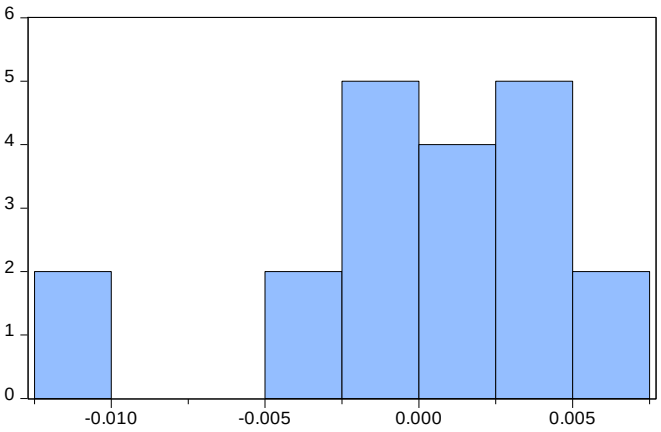
Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NFDI	-0.014111	0.006465	-2.182748	0.0540
NLTRDOPN	0.671117	0.114180	5.877694	0.0002
NTRDLIB	-0.016449	0.002294	-7.170491	0.0000
C	-1.653587	0.912797	-1.811562	0.1001

Appendix E: Stability and Diagnostic tests

South Africa

Jarque-Bera Residuals test:



Series: Residuals	
Sample 1996 2015	
Observations 20	
Mean	-8.55e-16
Median	0.000325
Maximum	0.006890
Minimum	-0.011653
Std. Dev.	0.005000
Skewness	-1.008436
Kurtosis	3.554762
Jarque-Bera	3.646278
Probability	0.161518

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.587232	Prob. F(4,15)	0.6769
Obs*R-squared	2.707865	Prob. Chi-Square(4)	0.6078
Scaled explained SS	1.945674	Prob. Chi-Square(4)	0.7458

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Sample: 1996 2015

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000534	0.001461	-0.365524	0.7198
SLGDP(-1)	-0.000310	0.000539	-0.575859	0.5732
STRDLIB	-9.38E-06	1.20E-05	-0.780748	0.4471
FDI	-7.31E-06	6.80E-06	-1.074944	0.2994
SLTRDOPN	0.000244	0.000398	0.612083	0.5496

R-squared	0.135393	Mean dependent var	2.38E-05
Adjusted R-squared	-0.095169	S.D. dependent var	3.89E-05
S.E. of regression	4.08E-05	Akaike info criterion	-17.16546
Sum squared resid	2.49E-08	Schwarz criterion	-16.91653
Log likelihood	176.6546	Hannan-Quinn criter.	-17.11687
F-statistic	0.587232	Durbin-Watson stat	1.839746
Prob(F-statistic)	0.676880		

Heteroskedasticity Test: Harvey

F-statistic	1.208383	Prob. F(4,15)	0.3480
Obs*R-squared	4.874101	Prob. Chi-Square(4)	0.3005
Scaled explained SS	15.56820	Prob. Chi-Square(4)	0.0037

Test Equation:
Dependent Variable: LRESID2
Method: Least Squares
Sample: 1996 2015
Included observations: 20

Variable	Coefficien	Std. Error	t-Statistic	Prob.

	t			
C	-286.6548	142.9405	-2.005414	0.0633
SLGDP(-1)	5.291896	52.68992	0.100435	0.9213
STRDLIB	1.569937	1.175306	1.335769	0.2015
FDI	0.339544	0.665600	0.510133	0.6174
SLTRDOPN	32.81493	38.94690	0.842556	0.4127

R-squared	0.243705	Mean dependent var	-12.86520
Adjusted R-squared	0.042026	S.D. dependent var	4.073287
S.E. of regression	3.986775	Akaike info criterion	5.816160
Sum squared resid	238.4156	Schwarz criterion	6.065093
Log likelihood	-53.16160	Hannan-Quinn criter.	5.864755
F-statistic	1.208383	Durbin-Watson stat	1.808717
Prob(F-statistic)	0.348041		

Heteroskedasticity Test: Glesjer test

F-statistic	0.458878	Prob. F(4,15)	0.7647
Obs*R-squared	2.180526	Prob. Chi-Square(4)	0.7026
Scaled explained SS	1.959245	Prob. Chi-Square(4)	0.7433

Test Equation:

Dependent Variable: ARESID

Method: Least Squares

Sample: 1996 2015

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.091451	0.125657	-0.727784	0.4780
SLGDP(-1)	-0.030286	0.046319	-0.653853	0.5231
STRDLIB	-0.000510	0.001033	-0.493767	0.6286
FDI	-0.000370	0.000585	-0.632556	0.5365
SLTRDOPN	0.028873	0.034238	0.843309	0.4123

R-squared	0.109026	Mean dependent var	0.003662
Adjusted R-squared	-0.128567	S.D. dependent var	0.003299
S.E. of regression	0.003505	Akaike info criterion	-8.257101
Sum squared resid	0.000184	Schwarz criterion	-8.008168
Log likelihood	87.57101	Hannan-Quinn criter.	-8.208507
F-statistic	0.458878	Durbin-Watson stat	2.006953
Prob(F-statistic)	0.764730		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.542175	Prob. F(2,13)	0.2506
Obs*R-squared	3.835219	Prob. Chi-Square(2)	0.1470

Test Equation:

Dependent Variable: RESID

Method: ARDL

Sample: 1996 2015

Included observations: 20

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SLGDP(-1)	-0.047135	0.077558	-0.607742	0.5538
STRDLIB	-0.001510	0.001827	-0.826456	0.4235
FDI	-0.000334	0.000935	-0.357339	0.7266
SLTRDOPN	0.000490	0.053198	0.009209	0.9928
C	0.185429	0.222571	0.833122	0.4198
RESID(-1)	0.461802	0.330955	1.395362	0.1863
RESID(-2)	0.472157	0.390220	1.209976	0.2478

R-squared	0.191761	Mean dependent var	-8.55E-16
Adjusted R-squared	-0.181272	S.D. dependent var	0.005000
S.E. of regression	0.005434	Akaike info criterion	-7.322928
Sum squared resid	0.000384	Schwarz criterion	-6.974422

			-7.254896
Log likelihood	80.22928	Hannan-Quinn criter.	
			2.048092
F-statistic	0.514058	Durbin-Watson stat	
Prob(F-statistic)	0.787629		

Nigeria

ARDL Cointegrating And Long Run Form
Dependent Variable: NLGDP
Selected Model: ARDL(1, 0, 3, 0)
Sample: 1995 2015
Included observations: 18

Cointegrating Form

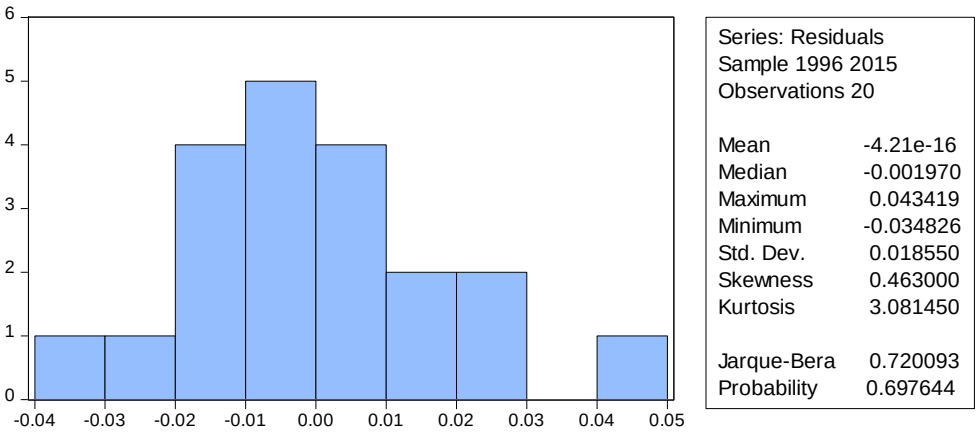
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NFDI)	-0.012170	0.006236	-1.951537	0.0795
D(NLTRDOPN)	0.017033	0.099204	0.171698	0.8671
D(NLTRDOPN(-1))	-0.109627	0.098826	-1.109296	0.2933
D(NLTRDOPN(-2))	-0.186817	0.091990	-2.030837	0.0697
D(NTRDLIB)	-0.014186	0.004078	-3.478807	0.0059
CointEq(-1)	-0.862438	0.262331	-3.287598	0.0082

Cointeq = NLGDP - (-0.0141*NFDI + 0.6711*NLTRDOPN - 0.0164
*NTRDLIB -1.6536)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NFDI	-0.014111	0.006465	-2.182748	0.0540
NLTRDOPN	0.671117	0.114180	5.877694	0.0002
NTRDLIB	-0.016449	0.002294	-7.170491	0.0000
C	-1.653587	0.912797	-1.811562	0.1001

Jarque-Bera Residuals test:



Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.672095	Prob. F(5,14)	0.0248
Obs*R-squared	11.34747	Prob. Chi-Square(5)	0.0449
Scaled explained SS	5.786703	Prob. Chi-Square(5)	0.3275

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Sample: 1996 2015

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001684	0.010347	0.162749	0.8730
NLGDP(-1)	-0.007978	0.002534	-3.148103	0.0071
NTRDLIB	-0.000127	5.51E-05	-2.310370	0.0366
NFDI	-0.000230	9.89E-05	-2.330324	0.0353
NLTRDOPN	-0.000687	0.001413	-0.486434	0.6342
NLTRDOPN(-1)	0.004165	0.001317	3.161568	0.0069

R-squared	0.567374	Mean dependent var	0.000327
Adjusted R-squared	0.412864	S.D. dependent var	0.000484
S.E. of regression	0.000371	Akaike info criterion	-12.71877
Sum squared resid	1.92E-06	Schwarz criterion	-12.42005
Log likelihood	133.1877	Hannan-Quinn criter.	-12.66045
F-statistic	3.672095	Durbin-Watson stat	1.537755
Prob(F-statistic)	0.024797		

Heteroskedasticity Test: Harvey

Heteroskedasticity Test: Harvey

F-statistic	0.645154	Prob. F(5,14)	0.6697
Obs*R-squared	3.745286	Prob. Chi-Square(5)	0.5866
Scaled explained SS	4.402760	Prob. Chi-Square(5)	0.4930

Test Equation:
Dependent Variable: LRESID2
Method: Least Squares
Sample: 1996 2015
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-35.63132	72.43244	-0.491925	0.6304
NLGDP(-1)	-17.35194	17.74035	-0.978106	0.3446
NTRDLIB	-0.401123	0.385841	-1.039607	0.3161
NFDI	-0.538697	0.692059	-0.778398	0.4493
NLTRDOPN	-0.382815	9.892498	-0.038697	0.9697
NLTRDOPN(-1)	11.93922	9.221555	1.294708	0.2164

R-squared	0.187264	Mean dependent var	-9.545073
Adjusted R-squared	-0.102998	S.D. dependent var	2.471116
S.E. of regression	2.595258	Akaike info criterion	4.988574
Sum squared resid	94.29510	Schwarz criterion	5.287294

			4
			5.04688
Log likelihood	-43.88574	Hannan-Quinn criter.	7
			1.72202
F-statistic	0.645154	Durbin-Watson stat	6
Prob(F-statistic)	0.669673		

Heteroskedasticity Test: Glesjer test

Heteroskedasticity Test: Glejser

F-statistic	1.864394	Prob. F(5,14)	0.1648
Obs*R-squared	7.994154	Prob. Chi-Square(5)	0.1566
Scaled explained SS	6.262072	Prob. Chi-Square(5)	0.2815

Test Equation:
Dependent Variable: ARESID
Method: Least Squares
Sample: 1996 2015
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.081333	0.297978	-0.272951	0.7889
NLGDP(-1)	-0.147479	0.072982	-2.020766	0.0629
NTRDLIB	-0.002166	0.001587	-1.364604	0.1939

NFDI	-0.004626	0.002847	-1.624856	0.1265
NLTRDOPN	-0.012208	0.040697	-0.299965	0.7686
NLTRDOPN(-1)	0.091968	0.037936	2.424275	0.0295

R-squared	0.399708	Mean dependent var	0.013927
Adjusted R-squared	0.185318	S.D. dependent var	0.011829
S.E. of regression	0.010677	Akaike info criterion	-5.998205
Sum squared resid	0.001596	Schwarz criterion	-5.699486
Log likelihood	65.98205	Hannan-Quinn criter.	-5.939892
F-statistic	1.864394	Durbin-Watson stat	1.684839
Prob(F-statistic)	0.164757		

Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.785849	Prob. F(2,12)	0.2094
Obs*R-squared	4.587423	Prob. Chi-Square(2)	0.1009

Test Equation:

Dependent Variable: RESID

Method: ARDL

Sample: 1996 2015

Included observations: 20

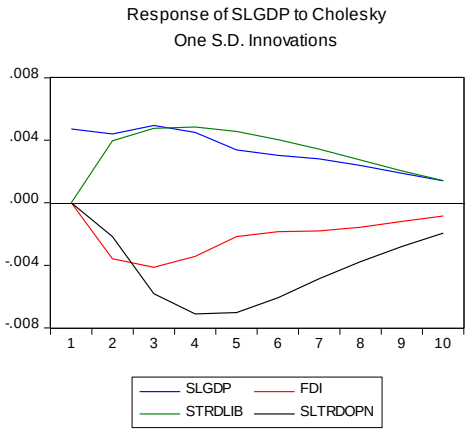
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NLGDP(-1)	-0.056874	0.149607	-0.380157	0.7105
NTRDLIB	-0.001521	0.003916	-0.388359	0.7046
NFDI	-0.000114	0.005572	-0.020451	0.9840
NLTRDOPN	0.054880	0.083346	0.658467	0.5227
NLTRDOPN(-1)	-0.018263	0.074547	-0.244991	0.8106
C	-0.078968	0.628228	-0.125699	0.9021
RESID(-1)	0.298839	0.318557	0.938102	0.3667
RESID(-2)	-0.568948	0.357151	-1.593019	0.1371

R-squared	0.229371	Mean dependent var	-4.21E-16
Adjusted R-squared	-0.220162	S.D. dependent var	0.018550
S.E. of regression	0.020490	Akaike info criterion	-4.648585
Sum squared resid	0.005038	Schwarz criterion	-4.250292
Log likelihood	54.48585	Hannan-Quinn criter.	-4.570834
F-statistic	0.510243	Durbin-Watson stat	1.827487
Prob(F-statistic)	0.810319		

Appendix F: Impulse response

South Africa


Response of SLGDP to Cholesky
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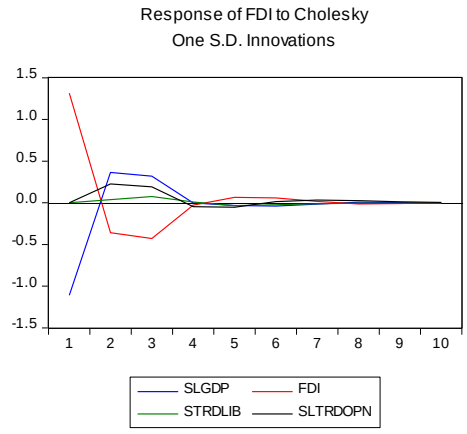
SLGDP FDI
STRDLIB SLTRDOPN


Response of FDI to Cholesky
One S.D. Innovations
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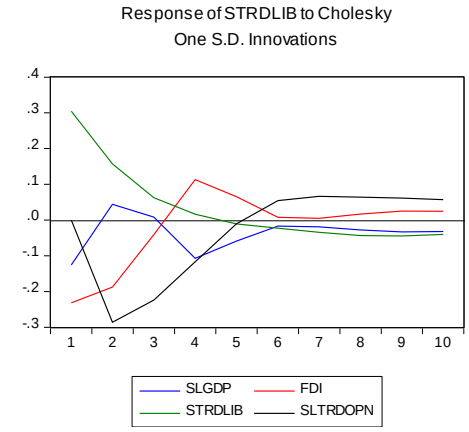
SLGDP FDI
STRDLIB SLTRDOPN


Response of STRDLIB to Cholesky
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-.3
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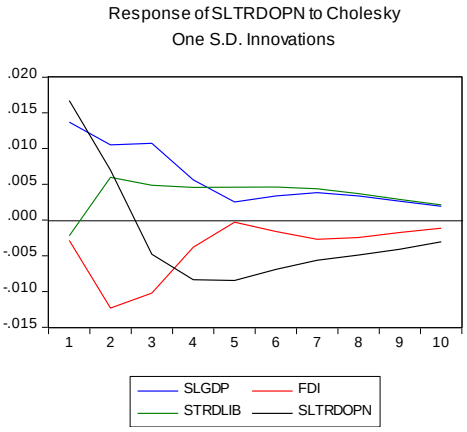
SLGDP FDI
STRDLIB SLTRDOPN


Response of SLTRDOPN to Cholesky
One S.D. Innovations
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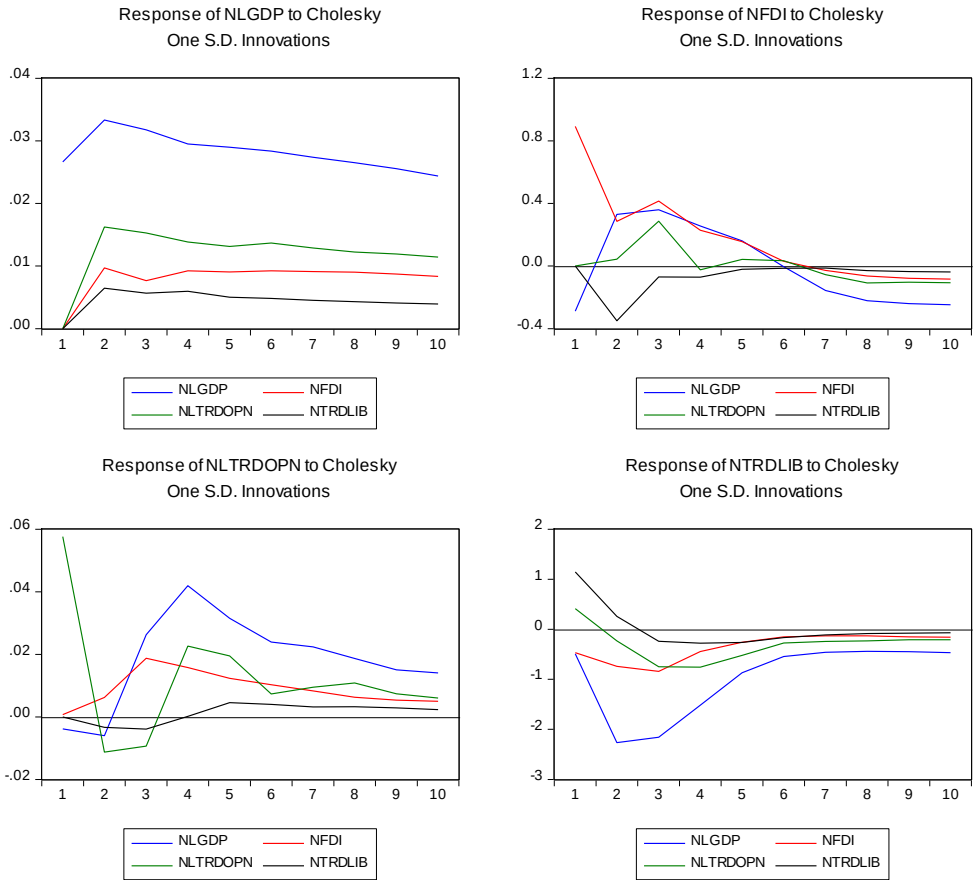
-.010
-.015
1 2 3 4 5 6 7 8 9 10
SLGDP FDI
STRDLIB SLTRDOPN

Nigeria



Appendix G: Variance decomposition

South Africa

Variance Decomposition of SLGDP:

Period	S.E.	SLGDP	FDI	STRDLIB	SLTRDOPN
1	0.004719	100.0000	0.000000	0.000000	0.000000
2	0.008652	55.59465	17.17964	20.96498	6.260724
3	0.013145	38.23306	17.28095	22.21064	22.27534
4	0.016702	30.93901	14.94055	22.16631	31.95412
5	0.019113	26.76603	12.69129	22.61554	37.92714
6	0.020767	24.80929	11.54185	22.95271	40.69614
7	0.021859	24.04130	11.10131	23.17607	41.68132
8	0.022530	23.75050	10.93045	23.28522	42.03383
9	0.022904	23.66319	10.85080	23.31925	42.16676
10	0.023088	23.66055	10.81150	23.32709	42.20086

Variance Decomposition of FDI:

Period	S.E.	SLGDP	FDI	STRDLIB	SLTRDOPN
1	1.720768	41.63343	58.36657	0.000000	0.000000
2	1.809475	41.66577	56.72450	0.041387	1.568350
3	1.897941	40.72369	56.64822	0.192996	2.435098
4	1.898759	40.68871	56.62054	0.195865	2.494886
5	1.901221	40.61226	56.59183	0.229573	2.566335
6	1.902732	40.58974	56.59768	0.245258	2.567328
7	1.903176	40.57755	56.57888	0.248240	2.595324
8	1.903430	40.56844	56.56938	0.249066	2.613114
9	1.903497	40.56588	56.56738	0.249736	2.617004
10	1.903516	40.56566	56.56654	0.250501	2.617294

Variance Decomposition of STRDLIB:

Period	S.E.	SLGDP	FDI	STRDLIB	SLTRDOPN
1	0.402661	9.781516	33.10675	57.11174	0.000000
2	0.553217	5.819164	29.05422	38.33290	26.79372
3	0.601591	4.939987	25.03397	33.49556	36.53048
4	0.632603	7.350012	25.84777	30.35641	36.44581
5	0.638824	8.046873	26.38970	29.79791	35.76551
6	0.641821	8.042072	26.15728	29.65010	36.15054
7	0.646481	8.014154	25.78675	29.51007	36.68902
8	0.651891	8.061430	25.42807	29.46728	37.04322
9	0.657652	8.177013	25.12984	29.41720	37.27595
10	0.662592	8.292973	24.88990	29.35088	37.46625

Variance Decomposition of SLTRDOPN:

Period	S.E.	SLGDP	FDI	STRDLIB	SLTRDOPN
1	0.021924	39.12934	1.707075	1.009063	58.15452
2	0.028763	36.12431	19.31133	4.893081	39.67128
3	0.033072	37.87048	24.16352	5.861100	32.10490
4	0.035078	36.23100	22.65817	6.912882	34.19794
5	0.036464	34.01273	20.97606	7.985567	37.02564
6	0.037583	32.81996	19.92717	9.030693	38.22218
7	0.038539	32.19545	19.43625	9.883366	38.48493
8	0.039249	31.77508	19.13086	10.42251	38.67155
9	0.039689	31.51121	18.90352	10.71489	38.87038
10	0.039925	31.37399	18.76217	10.86859	38.99525

Cholesky Ordering: SLGDP FDI STRDLIB SLTRDOPN

Nigeria

Variance Decomposition of NLGDP:

Period	S.E.	NLGDP	NFDI	NLTRDOPN	NTRDLIB
1	0.026644	100.0000	0.000000	0.000000	0.000000
2	0.047113	82.01872	4.225343	11.88397	1.871973
3	0.059599	79.63882	4.293997	13.99217	2.075006
4	0.068807	78.12929	5.018225	14.54466	2.307817
5	0.076509	77.54157	5.455060	14.70818	2.295196
6	0.083391	76.84600	5.822845	15.06610	2.265059
7	0.089288	76.42604	6.122054	15.21971	2.232200
8	0.094465	76.14329	6.381225	15.27506	2.200418
9	0.099052	75.91031	6.578846	15.33948	2.171366
10	0.103058	75.71427	6.733431	15.40169	2.150618

Variance Decomposition of NFDI:

Period	S.E.	NLGDP	NFDI	NLTRDOPN	NTRDLIB
1	0.937828	9.485406	90.51459	0.000000	0.000000
2	1.092618	16.09920	73.47468	0.162738	10.26338
3	1.257730	20.31594	66.30075	5.329076	8.054233
4	1.305655	22.67005	64.57694	4.979538	7.773476
5	1.325517	23.46945	64.03126	4.931681	7.567613
6	1.326381	23.43998	64.00030	4.990585	7.569136

7	1.337133	24.43756	63.02113	5.083262	7.458042
8	1.361475	26.21555	61.00467	5.539105	7.240678
9	1.389004	28.17676	58.92704	5.874003	7.022206
10	1.418019	30.09266	56.88790	6.212143	6.807294

Variance Decomposition of NLTRDOPN:

Period	S.E.	NLGDP	NFDI	NLTRDOPN	NTRDLIB
1	0.057758	0.445217	0.015273	99.53951	0.000000
2	0.059573	1.448081	1.101087	97.12827	0.322566
3	0.068507	15.81239	8.295827	75.31586	0.575929
4	0.084930	34.65755	8.851228	56.11627	0.374945
5	0.093585	39.87897	9.025549	50.55167	0.543811
6	0.097501	42.77166	9.427562	47.13387	0.666903
7	0.100871	44.87077	9.487660	44.91775	0.723817
8	0.103392	45.97046	9.394401	43.84870	0.786444
9	0.104915	46.70208	9.382293	43.07574	0.839884
10	0.106160	47.35627	9.385297	42.38975	0.868687

Variance Decomposition of NTRDLIB:

Period	S.E.	NLGDP	NFDI	NLTRDOPN	NTRDLIB
1	1.391714	12.40664	11.34881	8.712501	67.53205
2	2.780948	69.38072	9.962201	2.877499	17.77957
3	3.704340	73.05278	10.79259	5.715047	10.43958

4	4.107556	73.05332	9.947255	8.049311	8.950109
5	4.246715	72.52803	9.678079	9.033720	8.760171
6	4.296162	72.47691	9.579024	9.231690	8.712371
7	4.330861	72.44140	9.518923	9.398428	8.641251
8	4.362420	72.42278	9.474536	9.546973	8.555712
9	4.393670	72.44081	9.455178	9.639828	8.464183
10	4.426652	72.47242	9.443548	9.719903	8.364128

Cholesky Ordering: NLGDP NFDI NLTRDOPN NTRDLIB

Appendix H: Ramsey RESET test

South Africa

Ramsey RESET Test

Equation: UNTITLED

Specification: SLGDP SLGDP(-1) FDI SLTRDOPN STRDLIB C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	2.899925	14	0.0116
F-statistic	8.409563	(1, 14)	0.0116

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000178	1	0.000178
Restricted SSR	0.000475	15	3.17E-05
Unrestricted SSR	0.000297	14	2.12E-05

Unrestricted Test Equation:

Dependent Variable: SLGDP

Method: ARDL

Sample: 1996 2015

Included observations: 20

Maximum dependent lags: 1 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (1 lag, automatic):

Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
SLGDP(-1)	19.06763	6.326879	3.013749	0.0093
FDI	-0.002691	0.001180	-2.280115	0.0388
SLTRDOPN	6.075355	2.016064	3.013473	0.0093
STRDLIB	0.118269	0.039246	3.013537	0.0093
C	-66.22736	22.60889	-2.929262	0.0110
FITTED^2	-3.318329	1.144281	-2.899924	0.0116

R-squared	0.991537	Mean dependent var	3.833241
Adjusted R-squared	0.988515	S.D. dependent var	0.042960
S.E. of regression	0.004604	Akaike info criterion	-7.680461
Sum squared resid	0.000297	Schwarz criterion	-7.381742
Log likelihood	82.80461	Hannan-Quinn criter.	-7.622148
F-statistic	328.0598	Durbin-Watson stat	2.335535
Prob(F-statistic)	0.000000		

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

Nigeria

Ramsey RESET Test
Equation: EQ01
Specification: NLGDP NLGDP(-1) NFDI NLTRDOPN NLTRDOPN(-1)
NLTRDOPN(-2) NLTRDOPN(-3) NTRDLIB C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	5.557492	9	0.0004
F-statistic	30.88572	(1, 9)	0.0004

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.003302	1	0.003302
Restricted SSR	0.004265	10	0.000426
Unrestricted SSR	0.000962	9	0.000107

Unrestricted Test Equation:

Dependent Variable: NLGDP

Method: ARDL

Sample: 1998 2015

Included observations: 18

Maximum dependent lags: 1 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (3 lags, automatic):

Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
NLGDP(-1)	3.849491	0.680708	5.655128	0.0003
NFDI	-0.301612	0.052175	-5.780788	0.0003
NLTRDOPN	0.343325	0.076906	4.464217	0.0016
NLTRDOPN(-1)	6.472606	1.117831	5.790327	0.0003
NLTRDOPN(-2)	2.612281	0.453031	5.766226	0.0003
NLTRDOPN(-3)	4.530951	0.783028	5.786451	0.0003
NTRDLIB	-0.334610	0.057692	-5.799906	0.0003
C	-73.15634	12.91716	-5.663500	0.0003
FITTED^2	-3.608619	0.649325	-5.557492	0.0004

R-squared	0.995959	Mean dependent var	3.268443
Adjusted R-squared	0.992367	S.D. dependent var	0.118351
S.E. of regression	0.010340	Akaike info criterion	-5.99871

			4
			-5.55352
Sum squared resid	0.000962	Schwarz criterion	9
			-5.93732
		Hannan-Quinn criter.	9
Log likelihood	62.98843		
		Durbin-Watson stat	1.67516
F-statistic	277.2608		6
Prob(F-statistic)	0.000000		

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