

**THE RELATIONSHIP BETWEEN EMPLOYMENT AND ECONOMIC GROWTH  
IN SOUTH AFRICA**

BY

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**Mini-Dissertation**

**Submitted in fulfilment of the requirements for the degree**

**of**

**MASTERS**

**IN**

**BUSINESS ADMINISTRATION**

In the

**FACULTY OF MANAGEMENT AND LAW**

**Turf loop Graduate School of Leadership (T.G.S.L)**

**UNIVERSITY OF LIMPOPO**

**South Africa**

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**NOVEMBER: 2015**

**Dedication**

This dissertation is dedicated to the entire family of Mphela members for their support they gave me during the course of 2015 (MBA).

## **DECLARATION**

I, Miglas Phuti Mphela, declare that the work presented in this research is my own and has not been submitted to any other university including the University of Limpopo for the purpose of a Master of Business Administration. Materials used from other sources in this research have been duly acknowledged.

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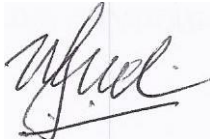
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## **ACKNOWLEDGEMENTS**

I would like to express my sincere gratitude to my supervisor, Prof C Ngwakwe. His guidance, support and assistance are greatly appreciated. I would also like to thank the entire lecturing and administrative staff of the Department of Business Administration at the University of Limpopo, Turfloop graduate school of leadership for their academic guidance and support. I thank and acknowledge the support of my family and friends. Above all I would like to thank GOD almighty for the strength he has given me to conduct this research.

## **Abstract**

Current literature has produced mixed findings on the relationship between economic growth and employment. Given the priority accorded to job creation in contemporary South Africa, this study has become necessary. Although this phenomenon has been studied in the past, but current research that extend the phenomenon up to 2014 is missing in the literature, hence this dissertation set out to extend the literature to 2014 with a view to offering an advice to policy makers based on current findings. The study was done in South Africa and it covers the period from 1994 to 2014. The study used number of econometrics techniques or test to analyse the relationship between employment and economic growth. The Johansen co-integration test was used to determine the long run equilibrium relationship. The Granger causality test was used to determine the causal relationship or direction of causality between economic growth and employment. The co-integration test shows that there is a long run equilibrium relationship between employment and economic growth in South Africa. In both long run and short run, there is a positive relationship between employment and economic growth. This shows that there is certainty that economic growth would necessarily lead to job creation in the long run in South Africa, therefore the policy implication is that the government has to be active to plan ahead for a long run job creation mechanism. The research recommends amongst others that the government should design policies to encourage foreign direct investment inflow to South Africa as this will create more job in the long run.

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## **LIST OF ACRONYMS**

ADF Augmented Dickey Fuller

ASGISA Accelerated and Shared Growth Initiative for South Africa

CPI Consumer Price Index

DTI Department of Trade and Industry

DW Durbin Watson

ECM Error Correction Model

ECT Error Correction Term

EG Engle and Granger

FDI Foreign Direct Investment

FIFA Federation of International Football Associations

GDP Gross Domestic Product

HDR Human Development Report

IMF International Monetary Fund

ILO International Labour Organization

J-B Jarque- Bera

NDP National Development Plan

OHS October Household Survey

OLS Ordinary Least Square

QLFS Quarterly Labour Force Survey

PP Phillips Perron

RSA Republic of South Africa

SARB South African Reserve Bank

StatsSA Statistics South Africa

VAR Vector Auto Regression

VECM Vector Error Correction Model

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# Chapter 1 INTRODUCTION

## 1.1 Background

This proposed research will analyse the relationship between employment and economic growth in South Africa between the periods of 1990 to 2014 (reason being that before 1990 there are no data available for these two important economic variables). Many developing countries, especially in Africa are faced with a growing inability or capacity to generate employment under the problematic conditions of their economic growth process. However, employment should be one of the important macroeconomic key mediators between economic growth and poverty reduction as it plays an important role in human development and the satisfaction of their needs (Herman, 2012). According to Herman (2012), the issue of employment growth and economic growth has become widely debated on why employment does not grow enough although the economy of the country is growing.

In terms of the economic growth, in the 1980's and the early 1990's South Africa experienced a declined economic growth, reason being that there were civil conflicts and increasing international isolation as well as the deliberate suppression of the majority black population, (Fedderke, 2005). After 1994, South Africa started enjoying a substantial and improved economic performance. The economic performance in terms of growth rate for real gross domestic product (GDP) was averaging at around 3.3%. Since the advent of democracy the unemployment rate has been hovering between 25% and 36%, (Epstein, 2008). In 2008-2009 the South African economic growth started to decline as a result of the global crisis or global downturn (Kearney & Odusola, 2011). In most countries, both developing and developed, economic performance was starting to recover around the world because the recession appeared to be either over or almost over in most industrialised countries (Herman, 2011). One also needs to know how this recovery is connecting to recovery in employment; there is still some risk, however. For instance, the possibility of W-shaped recovery cannot be ruled out completely (Durocher, 2009), which current academic research has not recently examined in South Africa. According to Herman (2011), economic growth should play an important role in the rhythm of job creation in the country from one period to the next. In related recent

studies economic growth and employment have shown a strong positive relationship, meaning that when the economic performance rises, the employment tend to increase. On the other hand, apart from economic growth, there is also an ongoing debate in the literature regarding the relationship between foreign direct investment (FDI), inflation and employment. For example, previous researchers believe that an increased inflow of FDI in the country tends to boost both job opportunities and economic growth in the country while inflation tends to have a negative impact on employment. The study of Jayaraman and Choong (2006) shows that FDI inflows contribute to employment by transfer of technology, domestic managerial skills, domestic saving, reduces the resources gaps etc. Thus in researches conducted in other countries, the causality between FDI and economic growth tend to run in both directions (Smarzynska, 2002). There is therefore the need to conduct an academic examination of how economic growth has impacted on employment in South Africa within the period just before and after the recession, this is what this proposed research hopes to do.

This proposed research will analyse the relationship between employment and economic growth in South Africa between the periods of 1990 to 2014 (reason being that before 1990 there were no data available for these two important economic variables). Many developing countries, especially in Africa are faced with a growing inability or capacity to generate employment under the problematic conditions of their economic growth processes. However, employment should be one of the important macroeconomic key mediators between economic growth and poverty reduction as it plays an important role in human development and the satisfaction of their needs (Herman, 2012). According to Herman (2012), the issue of employment growth and economic growth has become widely debated on why employment does not grow enough although the economy of the country is growing.

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## **1.2 Problem statement**

The problem regarding the relationship between these two important macroeconomic concepts of economic growth and employment has received much attention from many economists and policy makers around the world and there are various conclusions regarding the relationship. Some have been arguing that there is a positive relationship between these macroeconomic concepts (economic growth and employment) while some argue that there is a negative relation. Between 1990 and 2014 in South Africa little research has been done (especially since after the recession (world financial crisis) in 2008-09) on the relationship between these important economic concepts or variables using the econometrics model/ techniques. Unemployment is one the important macroeconomic problems that needs to be addressed by the South African policy makers because of its possible connection with crime and social instability (Celik and Tatar, 2011).

South Africa's economic growth has been slow over the years with an average growth rate of less than 4 % from 1999 to 2007. However In 2008 the whole world was faced with a financial crisis which affected many developing countries' economic growth and South Africa was one of those countries. The economic growth rate fell to 3.1% in 2008 and to 1.8 % in 2009 before a significant recovery of 4.6 % during the first quarter of 2010. This economic growth fluctuation indeed may have affected the employment rate. In addition to the economic growth effect on employment, it is

also important to consider two other factors commonly referred to in the literature because of their effect on employment which is inflation and FDI and these were also touched negatively during the financial crises. But no known academic research has been conducted since after the financial crisis to how how a combination of these variables have impacted on employment in SA, hence this research hopes to make a contribution by filling this gap in literature.

### **1.3 Aim of the study**

The aim of the study is to analyse the relationship between economic growth and employment in South Africa from 1994 to 2014.

### **1.4 Research Questions/hypotheses**

#### **Questions**

- ✚ What is the relationship between employment and economic growth in South Africa?
- ✚ What suggestions and recommendations can arise from the analysis?

#### **Hypotheses**

- ✚ H0: economic growth does not enhance employment.
- ✚ H1: economic growth enhances employment.

### **1.5 Objectives of the study**

The objectives arising from the aim are:

- ✚ To examine the relationship between economic growth and employment in South Africa.
- ✚ To formulate suggestions and recommendations arising from the analysis.

### **1.6 Motivation/rationale for the study**

Low growth, high unemployment and high instability characterize the economy in most developing countries around the world (Elbadawi and Schmidt-Hebbel, 1999). This research hopes to contribute to the existing growing body of literature about South African macroeconomic factors to understand how the South African economy is performing with regards to the variables under study. It will also be helpful for

people who are dealing with economic policy (e.g. economists) in South Africa, for example after this study they can identify what need to be done to deal with the high unemployment rate in South Africa.

### **1.7 Significance of the study**

The major focus of the previous studies has been to determine whether there is a strong positive relationship between economic growth and employment. This research is significant since it hopes to add to the existing theory and knowledge by adding two other variables – FDI and inflation to this relationship within the South African context. Since South Africa aims to reduce the unemployment rate which can be done through employment from inclusive growth, there is a need for more information regarding the employment-growth relationship. This information could assist policy makers to come up with policies that will speed up growth, create employment and reduce unemployment as economic growth is a primary solution to unemployment. The results of the analysis will therefore provide a good source of policy recommendation.

### **1.8 Definition of concepts**

**Some of the concepts used in the research report include the following:**

#### **Economic growth**

Economic growth is a long term performance of the economy concerned and the ability of the economy's productive capacity to expand and the ability to use that productive capacity (Mishkin, 2001). Economic growth can be measured as real GDP or nominal GDP (Gross Domestic Product).

#### **Employment**

Black (2009) defines employment as a service performed for salaries or wages under a contract of hire. It is the number of people in an economy who provides services for pay under a contract (this includes both the full-time and part-time workers in private, public, non-profit and household sectors), as well as the self-employed. Employment may also be defined as people 16 years or older who worked any hours during the past week, whether as paid employees or in their own businesses. This definition of employment also includes people who worked 15



hours or more as unpaid workers in a business operated by a family member (Thirlwall, 2006).

## **FDI**

Foreign direct investment is defined as an investment made to acquire a lasting interest by an entity resident in one economy in an enterprise resident in another economy (Black, 2009).

## **Inflation**

Inflation is a rise in the general level of the prices of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys fewer goods and/or services (Mishkin, 2001).

### **1.9 Research limitation**

Analytically while there are various mathematical and statistical models to evaluate the relationship between economic growth inflation and employment, but the research is relying on the regression model and econometric graphs. The researcher only focuses on the period from 1990 to 2014. This means that any correlation before and after the above mentioned period is not analysed by the researcher.

### **1.10 Ethical Considerations**

The research is being done without conducting any plagiarism or any other unlawful act such as misquoting other studies. The study is done by using reliable secondary data which is not manipulated. The researcher acknowledged all the sources used and has also taken into account the rules of the University of Limpopo in conducting a research for a Master's degree requirements.

## **Conclusion**

This Chapter started by introducing the two important macroeconomic variable and the research problem. It also includes the motivation which followed by the aim and objectives of the study. It also shows the questions that are answered by the study (whether there is positive or negative relationship between economic growth and employment).

## **CHAPTER 2**

### **Literature Reviews**

#### **2.1. Introduction**

This section presents a literature review on the key variables of the study namely employment and economic growth. After this, the previous literature on the positive, negative and neutral relationships between employment and economic growth is presented. Further on, the causality between economic and employment is also reviewed. It also includes other factors that may affect the level of employment.

#### **2.2. Employment**

Black (2009) defines employment as a service performed for salaries or wages under a contract of hire. Many people in the economy tend to be hired under the contract to perform the service in return they get remuneration (wages and salaries) and this also include those who are self-employed. In addition, Self-employment is the work carried out as a business, rather than as an employee. The self-employed are responsible for their tax and national insurance. The self-employed are also responsible for their health and safety (Gruber & Poterba, 1994). Income from self-employment is a mixture of rewards for work, returns on private capital employed and rewards for entrepreneurship (Maloney, 2003).

Employment assists in poverty reduction and human development, hence the importance of employment in economic growth and development (Thirlwall, 2006). Employment may also be defined as people 16 years or older who worked any number of hours during the past week, whether as paid employees or in their own businesses. This definition of employment also includes people who worked 15 hours or more as unpaid workers in a business operated by a family member (Howarth et al., 2015).

Klasen and Woolard (2000) found that because of high levels of unemployment most young people's lives are delayed, like having to make households for themselves.

For many it takes many years and those who employed them are unable to afford them which results in their returning to their parents, other relatives and friends who also depend on state transfers like the old age pensions. Not everyone is that lucky to have state support which results in poverty for many households. Berument et al. (2008) investigated in Turkey about the total unemployment by sectors of economic activity and this was discovered during the period 1988:01 and 200:04. This macroeconomic observation was not only shocking due to unemployment only but also by the monetary policy. This VAR model estimates other shocks in other places like the real GDP, price, exchange rates and many more sectors of economic activity and due to this model it was discovered that positive income is followed by a decrease in unemployment except in other sectors like the electricity and community sectors. Due to the technical change in many parts of the world, unemployment has reached its maximum, mainly due to lack of skills especially in the mining and agricultural sectors, writes Levinsohn (2007). These are sectors where unskilled black women are employed and many are under-educated and because of this less skilled workers getting jobs easily. The majority of graduates in South Africa remain unemployment which increases daily. By going back to an earlier form or state, Caraianni (2008) was able to track the difference between employment and unemployment cycles and law and the economic activity cycles and by using the Okun's law he realized why it worked for Korea for decades and again the results showed a low response of labor market because of the changes in the economy. The constraints in unemployment in South Africa, documented by Banarjee et al. (2006), showed the high rise during the transition in 1994. The debate was whether it was due to changes in structures in the economy or if it was due to negative shocks which increased unemployment and the conclusion was it was due to changes in labour market status.

### **2.3. Economic growth**

Klein (2011) discovered that measurement of the South African Potential on the number of growth for the Period 1985-2011 by using the structural and non-structural method, while examiners suggest the potential number of growth is steadily increasing in the post apartheid era to about 3,5 percent (1994-2008). It was also decreasing faster following the outbreak of the financial crisis which was seen in

other progressing and upcoming economies and while this shows that at around 1,5 percent the expected 2010 output was slower and lower than previously expected and there is also a fair amount of uncertainty with regard to a clear magnitude showing in the backward methods. His view is that the growth potential is likely to slowly return to its pre-crisis pace and that most of the gap would have closed by 2012.

According to Fedderke and Simkins (2009), the capacity of South Africa's growth has been steadily rising since the 1970's, as it was in many decades. During the 1970's and 1980's there was a strong growth of exports causing economic growth meaning if more attention is paid to the export production it greatly enhances the growth process of the South African economy. Technology was the single strongest contributor to growth and this was during the year 1990.

As for Du Plessis and Smit (2007), they revealed that in the past two decades that multifactor productivity played a very important role in the South African economic growth using the accounting model. It was discovered that productivity growth became the major factor in growth revival in the ten years after 1994, even though the difference was clearly seen by growth productivity in the ten years before 1994. It clearly shows that the contribution of capital to growth was higher since 1994 than in the previous decade and in the process the labour contribution decreased heavily, even though it was still positive. Fifty percent or more of South Africa's economic recovery happened later than expected due to the quality of total factor productivity growth. Even though it was difficult to account for this recovery in production growth it clearly showed the economy increased well due the international trade which caused a rise in productivity locally. So, due to the lower interest rates, South Africa's growth recovered well.

The policy change and economic growth that was examined by Faulkner and Lowewald (2008) shows that prior to 1994, South Africa experienced the worse period of economic growth and this was during the second world war, and this was due to potential instability and financial sanctions, among other things, and in the process inflation increased heavily and investments declined greatly. During democracy, peace and a stable future were created which reserved the level of

investment to the positive side and on the other hand, potential and economic leadership also played a role in improving the country's growth performance due to policy formulation and the development of the institute.

According to Barro (1996), around 1960 to 1990 the economy growth was strongly supported by the general notion of conditional convergence and that around one hundred countries were involved due to the improved growth because of higher initial schooling, life expectancy, lower fertility. Many more things were easily achieved, but political freedom had a weakening effect on the growth but political rights and expansion did grow the economy. It was discovered by Kim and Lau (1996) that the quality of economic growth in the Asian developing countries is mainly controlled by the physical capital stock due to domestic saving, so investment and saving play an essential role for economic growth.

And while Howarth et al. (2015), identified an approach to economic growth and employment in Kosovo, it was discovered that the economic growth has been lower and slower than it was achieved in nearby countries and that more than one quarter of the individuals were unemployed. A diagnostics analytical framework was done to show the most binding limitations on economic growth and job creation. These bindings limited the growth and was found to be the costs and access to finance, poor giving of public goods and weakness in the rule of law. The research also suggests that the policy options for job creation must focus on increasing both economic growth and the employment intensity of growth.

Rangasamy (2008) confirmed that the economic policy does play an important role in the export production in the overall growth process in South Africa and the recent policy proposals once again confirmed this commitment, using certain techniques showed that exports play a role in economic growth in South Africa and in addition to that the gross domestic non primary exports should be given more attention.

Latzko (1999) applied an analytics model which assesses the income growth and levels among other countries, hence it was not able to explain the countries' growth experiences but at the same time it was able to rescue the human capital in many of these countries.

According to Millin and Nichola (2005), a different method was used in how manufacturing plays a huge role in growth in the economy and it was called the Kaldor growth and it proved beyond doubt that manufacturing can be considered as an engine of GDP in South Africa. The faster the growth rate in manufacturing, the faster the overall rate of productivity growth.

Plumber and Graff (2000) adopted a simple yet not obvious cause growth model which uses a more traditional approach which claims that integration of economy can be beneficial for economic performance and that a country's trade pattern has no impact on its economic performance. It also shows how government can help grow the economy by creating policies that create competitiveness in sectors and clearly shows that export specialization matters. They impact heavily on performances.

Denkabe (2003) analyzed the importance of foreign aid to economic growth by using a macroeconomic policy and by doing this it generalized moments of construction which resulted in a dynamic growth equation. In doing this more attention and focus was put on other things like country specific effects among others, so foreign aid plays a very positive role on economic growth.

#### **2.4. Economic growth and employment**

Economic growth is traditionally defined as the annual rate of increase in total production or income in the economy (Lewis, 2013). The production or income should be measured in real terms where the effects of inflation are eliminated and the figures should also be adjusted for population growth. Positive economic growth actually occurs only when total production or income is growing at a faster rate than the population, (Jorgenson et al., 2014).

Mahadea and Simson (2010) used the Harrod-Domar model to examine the relationship between economic growth and low employment performance. The study used a regression model to test the likely relationship between changes in the employment and changes in economic growth. The study found that there is a positive relationship between economic growth and employment. Even though there was a low growth of employment (elasticity) in their analysis.

According to William (2011), the relationship between economic growth and employment has been discussed much during the days of economic recovery. In the study there has been many arguments when it comes to the lagging and co-incident economic indicator. The author end up by saying that unemployment as lagging indicator is considered by many, while in terms of employment there is still disagreement on whether it is lagging or a co-incident economic indicator.

Akan et al. (2008) examined the nature of the relationship between employment and economic growth in Turkey. The research notes that the contribution from economic growth to employment in some countries is very slow and weak which thus reflects on the rising unemployment problem in many countries.

According to Ajilore and Yinusa (2011), Botswana is one of the many countries where unemployment grows steadily, as it was shown by the elasticity and economical procedures. They were able to see which sectors have the employment intensity and one of those sectors is the mineral sector which is leading the economy while other sectors are still very low with capacity.

Seyfried and Collage (2008) developed models of the relationship between growth and employment in the six developed countries. It was discovered that nations with high labour force growth or service sector have a high level of unemployment intensity even though it differed from 0.14 to 0.33 majority of the nation decreased in employed while another nation grew largely in the employment sector.

Akan et al. (2008) discovered that states that are less restrictive with the national government labour market policies have the greatest impact on employment growth like in the United States. It was discovered using the earlier models of economic growth of economic freedom on the U.S State employment growth and this was achieved because of the private property and private markets operating with minimal government interference. They discovered that the state employment growth is influenced mainly by state and local government policies. By using the employment coefficient it was discovered that when 1% point increases in economic growth than half a percentage also increases in employment. Because of the large labour force

and rising rates of unemployment in South Africa since 1990's it was concluded that the more the rise in economic growth, the more people will be employed and a decrease in unemployment (Hodge, 2009).

The ordinary least squares technique was used by Sodipe and Ogunrinola (2011) to reassess the difference between employment and economic growth in the Nigerian economy. There is a significant relationship that exists between employment level and economic growth as shown by the econometric analysis which is a positive one and on the other hand, a negative relation was also seen between employment, growth rate and the GDP growth rate in the economy.

Akan et al. (2008) used the knowledge economic technology to determine the relationship between employment and economic growth in the largest state and they concluded that the increase in birth rate the more the birth rate increases the more the work doubles in production and by doing this they managed to have an advantage over the national competitiveness and rendering.

According to Dumitrescu, Dedu and Enciu (2009) in Romania the unemployment and real GDP growth is determined by how high or low the unemployment growth is because the lower the unemployment growth is, the higher the increase in the economic growth. So if the percentage of the unemployment rises by a percentage point then a decrease of half a percentage is shown in the real GDP growth. By going back to earlier deductions and by drawing on the Harrod Domar model the low employment economic growth performance for the period 1994-2008 was analyzed by Mahadea and Simson (2010) and changes in economic growth and employment were regularly observed and highlighted and was found to be very low and that the marginal growth employment effect is weak but it wasn't all negative though because the impact size of growth on marginal employment is positive and less than equal.

Phelps (2008) states that immigrants have added largely to the overall GDP as well as the economic growth and because of their accomplishments in schooling they have given America an integrity as a country but as for the foreign born population their impact is slightly different and very negative by taking low paying jobs that decreased the wages rate and also the unemployment rate.



Momete (2007) said that with Romania being the leader among the EU-27 and with the highest population it was discovered that its economic growth was very high during the last years and it was because of its low employment of people and it also lacks people with tertiary education who mainly are in the primary sector in high numbers and more unemployment growth was seen in the last 10 years and more is expected.

According to Chang Kou (2007), there have been many studies about the issue of effective employment to economic growth but nothing has identified how this has happened. It showed that elasticity was shown by performance and technology parameters so technology is not the only thing responsible for the increase employment wages is an important factor with regard to employment effect of economic growth.

Siphambe (2007) found that up until the 1990's unemployment growth in Botswana was almost in line with the GDP but by 1991 because of population growth employment decreased in intensity and it was more because of the new rules that were being implemented to try to help grow the economy. The economy was growing rapidly since their independence in 1966 and it was because of the fact that the country is very rich in minerals. The mining also brought a large revenue back into the economy. Even though South Africa registered higher employment growth in the first period compared to the GDP and a decline in the second it didn't stay that way for long mainly because of the number of people entering the labour force every day and because of low paying jobs of foreigners just like in Brazil. Not enough employment was created instead of rebuilding the existing employment between sectors just like in China and India the labour law remains very ineffective because of low employment growth especially among the Africans. So whereas between the 1990's and 2000 employment growth was below GDP growth in Brazil, China and India it later picked up (Siphambe, 2007).

According to Tregenna (2007), manufacturing has been the main driver in the South African economy and many South Africans are employed in that sector, but the question is asked as to whether it will remain the key engine of the South African

economy. Recently the services has topped up(increase) the economy by employing more people and by having a sustainable growth manufacturing and shares are unfortunately less than expected due to the expected increase in services internationally.

In their research, Biyase and Bonga-Bonga (2007) applied the SVAR technique and it was used in discussion with regard to the issue of jobless growth in South Africa and it was discovered that a 1% increase in output led to 0,2 % increase in employment. Though these results were promising it is not an indication that South Africa is doing well with the backlog of unemployment. It is still a huge issue in South Africa.

Siphambe (2007) discovered that if the African manufacturing sector had expanded it is believed that it would have boosted the economy highly and many more jobs would have been created. The domestic transition is believed to be the consequence of the underperformance faced by people and the economy. More jobs would have been created if people cut down on high wage jobs, cost of labour and by expanding the capacity of the economy.

N'Guesson (2006) examined the relationship between employment in the modern private sector and economic growth as measured by real Gross Domestic Products (GDP). It was shown by the threshold co-integration model that the relationship between employment and real GDP is either the same or equal but the error correction model developed afterwards showed that a decrease in real GDP can increase the employment in the long run.

In his research Altman (2003) concluded that the experience of employment and unemployment over the past 10 years shows that more need to be done with regard to the high level of unemployment in South Africa as employment depends on both the labour absorption and capacity of the economy. To achieve high growth rates there should be more improvements in productivity and on domestic or foreign market demands even though they are both very difficult to achieve and they do not guarantee any labour absorption as was observed in the recent years.

According to Lewis (2002), South Africa is faced with pressing challenges like sustainable growth, poverty and job creation which none seem to be decreasing as researches have shown and unfortunately these challenges can't be fixed by quick schemes solutions but by initiating long term investments that will hold for decades to come and by making the labour market more flexible; but because of the growing pandemic of HIV/AIDS the success of these could be threatened. Dopke (2001) concluded that poor employment performance in Europe is partly because of low employment growth. It is still believed that unemployment and growth is still stable in the nineties. It is believed that it is important for the country to come up with the wage policy that will benefit both the country and its people in the long run no matter how unstable things may become.

## **2.5. Other factors that have an impact on the employment**

Other factors that may have an impact on the employment either positively or negatively are FDI, inflation, etc. Discussions below indicate how.

### **2.5.1 Foreign Direct Investment (FDI) and Employment**

According to Marelli et al. (2014), FDI may offer an important contribution to employment of the country, for example, new technology and skills and the creation of job opportunities in the country, but that will be contingent on the abilities to absorb these special effects to generate growth which depend on the quality of its economic policies. One of the components that mark a good policy is its ability to create a stable business environment, as defined by the World Bank (Gereffi, 2014).

According to Marelli et al. (2014), the inflow of FDI into the country tends to increase the economic activities which leads to more job opportunities. The study of Smarzynska (2002) supported the view that an inflow of FDI tends to have a positive effect in the job creation (employment) if the country in that it is more liberated. In their study, they also emphasize the fact that if the economy have more restrictions, the FDI tends to have a negative impact on the growth of the economy.

### **2.5.2 Inflation and employment**

Mishkin (2001) states that inflation is an over time period matter that may be defined as a general rise in the level of prices of goods and services in an entire economy.

Consequently, the general rise in the price of goods and services tend to decrease the purchasing power of money, for example the unit of account as well as the medium of exchange tend to lose the real value. Inflation rate is measured as a change in the annual consumer price index (CPI) over time. Inflation can have various effects on the economy (it can have a positive or negative effect on the economy or can be both positive and negative at the same time) for a country (Olivera and Julio, 2014). Inflation has been shown to reduce economic activity and therefore, employment in many ways, (Škare and Guglielmo, 2014). Individuals and businesses try to protect their wealth from inflation and in doing so waste time and resources. Therefore, inflation brings about inefficiencies that lead to the misallocation of resources and a general decline in employment. Reduced savings lead to reduced investments, which in turn reduce economic activities and the level of job creation in the economy (Škare and Guglielmo, 2014).

General uncertainty about future price levels discourages investment, leading to a lower capital stock in the economy. Furthermore, the returns on investments are reduced by inflation; therefore investors will invest in short-term capital rather than making long-term investments (Škare and Guglielmo, 2014). Investors would also rather invest in assets that can hedge against inflation (property, equity) rather than productive assets such as plants and equipment (Jones, 2001). This also impacts negatively on employment.

## **Conclusion**

The existence of positive relationship in many countries is not clear even if the theory states that there is a positive relationship between this two macroeconomic variables. In other countries, the relationship between economic growth and employment has been negative. But in the case of South Africa, no evidence was found to support the positive relationship between economic growth and employment.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1. Introduction**

This section is devoted to presenting the methodology of this study and commences by outlining the research design. It also indicates the study area and how the data used are collected. Finally, the data analysis is shown and the researcher, in addition, makes mention of any ethical matters that may have required considerations in the course of the study.

#### **3.2. Choice and rationale of research design**

The researcher employed a positivist research paradigm; the reason for using the positivist paradigm is that a positivist paradigm relies on objective measurement such as measurement of relationships between variables (Research Observatory, 2014). Based on the positivist approach therefore, the researcher used a quantitative research approach in order to measure the relationship between the variables in the research questions. The researcher used a causal research design as he will be investigating if economic growth causes a growth in employment in South Africa. Causal research design is most suitable for this research because the variables under study (economic growth and employment) are assumed to have a cause and effect relationship (Acs, 2006). Issues such as economic growth and employment, FDI and employment can be best measured using a causal design as previous causal links has been established in previous studies (e.g. Liu, Wang, & Wei, 2001; Chowdhury & Mavrotas, 2006).

#### **3.3. Study area**

The area of study is the South African economy and from which, the researcher attempts to understand the relationship between employment and economic growth. By looking at the trend of movement in the variables used in this study, the researcher judgementally chooses the sample period (1990 to 2014) for which data are collected, analysed and interpreted.

### **3.4. Population**

The study covered the entire South African population and its economic growth and employment trend between the periods 1994 to 2014 (25 years). The study of Mahadea and Simon (2010) used the entire South African population to analyse the relationship between low employment and economic growth.

### **3.5. Sample, sampling methods and sample size**

This study sample covered a period of 20 years (1994-2014) (reason being that before 1990 there are no data available for these two important economic variables) which is selected from reliable sources in South Africa. A purposive or judgmental sampling approach has been used to select 20 years of study, which is based on the reason that this is the extent that the researcher is able to source all the data needed for this study. This is also a manageable size for the researcher at this level of study.

### **3.6. Data collection**

The study employed annual data over the period 1994-2014. For the purpose of this, research data will be collected mainly from secondary sources, which are from Statistics South Africa, SARB Quarterly bulletins, Easy data website and the Department of trade and industry. The above organisations will provide this research with the data that are more reliable. The secondary data collected from the above mentioned sources are yearly employment in percentage (%) and economic growth in percentage (%). The data are freely available in the organisations' websites.

### **3.7. Data analysis**



### 3.7.2 Unit Root Test: The Augmented Dickey- Fuller (ADF) and Phillips-Perron Test

As the model contains economic variables of a time series nature, the empirical analysis starts by examining the statistical properties of these variables. The essence of analysing these properties is to determine if the variables in the model are stationary, so as to avoid spurious regression which might lead to a high  $R^2$  and thus, misleading results (Asteriou & Hall, 2007). The stationarity tests used are the Augmented Dickey- Fuller (ADF) and the Phillips-Perron tests. If variables are stationary in a model, they tend to have a constant variance and some elements of autocorrelation over time (Noula, 2012).

However, if a series is not stationary, it may become stationary only after differencing. For example, if a variable  $Z_t$  is not stationary, it may become stationary by differencing  $D_z$  times to achieve stationarity (Noula, 2012). The models that serve as a base for formulation of these tests are three in number:

$$Z_t = \rho X_{t-1} + Kt + L + \epsilon_t \quad (01) \text{ autoregressive model with an intercept and trend.}$$

$$Z_t = \rho X_{t-1} + K + \epsilon_t \quad (02) \text{ autoregressive model with an intercept.}$$

$$Z_t = \rho X_{t-1} + \epsilon_t \quad (03) \text{ autoregressive model with neither intercept nor trend.}$$

The ADF and Phillips-Perron rests on the key rule that if the null hypothesis ( $H_0: \rho = 1$ ) is accepted in any one of the three autoregressive equations above, it entails that the variable is stationary. It is performed in stages and in a specific sequence. The first stage involves estimating the first equation (1). However, prior to this, the maximum number of lags is estimated by using the formula below:

$$N^{1/3} = \text{Maximum number of lags} \dots \dots \dots (3)$$

Upon determining the approximate number of maximum lags that can be used, the parameters  $\rho$ ,  $K$  and  $L$ , of the first equation are estimated. The parameter  $K$ , in equation (1) is tested for significance using the t-statistics ( $H_0: K=0; H_1 \neq 0$ ). If  $K$  appears to be significantly different from zero, we test for  $\rho$  in the same model, that is,  $H_0: \rho = 1; \rho < 1$ ; if  $\rho = 1$ , the series is not stationary with trend; in the case  $\rho < 1$ , the



series is stationary. H1 is only accepted if critical values are greater than the ADF-statistic.

On the other hand, if K is significantly equal to zero, the researcher proceeds straight to equation (2) and repeat the same test, observing the procedure outlined beforehand in equation (1). If  $Z_t$  appears not to be stationary at level form, we difference the variables and re-apply the procedure used in level form.

### 3.7.3 Granger Causality Test

After the stationarity tests, the researcher carries out a Pairwise Granger Causality test. Causality is defined as,  $X_t$  is a Granger cause of  $Y_t$  (denoted as  $X_t \Rightarrow Y_t$ ), if  $Y_t$  can be predicted with greater accuracy by using past values of  $X_t$  rather than not using such past values, ceteris paribus (Granger, 1969). Testing for causality upholds a standard procedure outlined by Gujarati and Porter (2004) and thus, the Granger causality test is specified as:

$$W_t = U_1 + \omega_1(B) V_{t-i} + \Psi_1(B) W_{t-i} + \varepsilon_{1t} \dots \dots \dots (1)$$

$$V_t = U_2 + \omega_2(B) V_{t-i} + \Psi_2(B) W_{t-i} + \varepsilon_{2t} \dots \dots \dots (2)$$

In the above pair of regressions,  $V_t$  Granger causes  $W_t$  if  $\omega_1(B)$  is statistically not equal to zero. Similarly,  $W_t$  Granger causes  $V_t$  when  $\omega_2(B)$  is statistically not equal to zero. If none of the two scenarios are true then there is no causality between the two variables. Nonetheless, in the event that both scenarios are true, it implies that there exists bilateral or bidirectional or feedback causality (Noula, 2012). This research holds a similar method of performing the Granger causality to that used by Obi and Nurudeen (2009). Therefore, if probability value is greater than LOS (Level of significant), the decision rule requires that we reject null hypothesis and fail to reject alternative hypothesis. Similarly, in the event where probability value is less than LOS, we fail to reject the null and reject the alternative hypothesis.

### 3.7.4 JOHANSEN COINTEGRATION METHODOLOGY

Johansen's methods takes a starting point the vector autoregression (VAR) of order of p given by







$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \lambda \mu_{t-1} + \varepsilon_t = \beta_0 + \beta_1 \Delta X_t + \lambda (Y_{t-1} - \alpha_0 - \alpha_1 X_{t-1}) + \varepsilon_t \dots \dots \dots 11$$

The above equation is the appropriate specification of VECM. All terms in the above equation are 1(0) as long as the coefficient (the co-integrating vector) is known or at least consistently estimated. The  $\mu_{t-1}$  term is the magnitude by which  $y$  was above or below its long-run equilibrium value in the previous period. The coefficient  $\lambda$  (which we expect to be negative) represents the amount of correlation of the period  $(t-1)$  disequilibrium that happens in period  $t$ .

VECM model extends the ECM to allow  $y$  and  $x$  to evolve jointly over time as in a VAR system. In the two-variables cases, there can be only one co-integrating relationship and the Y equation of the VECM system is similar to ECM except that we mirror the VAR specification by putting a lagged difference of Y and X on the right-hand side, (Asteriou & Hall, 2007). With only one lagged difference (there can be more) the bivariate VECM can be written.

All the terms in both equations are 1(0) if the variables are co-integrated with co-integrating vectors  $(1-\alpha_0, -\alpha_1)$  in other words, if  $y_t - \alpha_0 - \alpha_1 x_t$  is stationary, the coefficient is again the error-correctional coefficient, meaning the response of each variable on the degree of deviation from long-run equilibrium in the previous period (Gujarati & Porter, 2009). We expect  $\lambda_y < 0$  for the same reason as above: if  $y_{t-1}$  is above its long-run values in relation to  $x_{t-1}$  the error-correctional term in parenthesis is positive and this should lead, other things being constant, to a downward movement in  $y$  in period  $t$ . The expected sign of  $\lambda_x$  depends on the sign of  $\alpha_1$  (Gujarati & Porter, 2009).

### 3.7.6 Diagnostic Tests

In order to ensure that the results of the error correction model yields true estimates, the researcher performs some diagnostic tests. The researcher commences by

performing the Jarque-Bera test. The essence of this test is to determine if the residuals are normally distributed in the model (Gujarati & Porter, 2009).

The researcher also performs the Ljung-Box Q and the Breusch-Pagan tests. The essence of carrying out these tests is to determine if autocorrelation exists in the model (Asteriou & Hall, 2007). Autocorrelation is the relationship between the elements of a sequence and others from the same sequence detached from them by a given time interval (Asteriou & Hall, 2007). The Ljung-Box Q test is computed of the order 6 and the Breusch-pagan is performed with a number of 2 lags. The researcher also tests for heteroskedasticity in the model. A series of random variables is heteroskedastic if the random variables have random variances (Asteriou & Hall, 2007). Hence, the researcher makes use of the ARCH test, White (Cross Terms: CT) test and the White (No Cross Terms: NCT) test. The white test with cross terms entails that variables influence each other in the model while that with no cross terms refers to the reciprocal.

### **3.7.7 Stability test**

The researcher also performs a stability test by using the Ramsey RESET test. The key principle of carrying out this test is to determine if the error correction equation is correctly specified. If the equation of the error correction model is incorrectly specified, it may lead to misspecification bias and wrong functional forms that would result in a high  $R^2$  and thus, yielding misleading results (Asteriou & Hall, 2007).

## **Conclusion**

Chapter three mainly focused on the methodology of the study which includes the data analysis method and technique that are used in the study. It started by providing information on South Africa as a country. Johansen and Juselius approached was taken into consideration to examine the relationship between economic growth and employment. Econometric techniques such as cointegration, VECM contain information that was used to estimate the relationship between economic growth and employment in the long and short run. Diagnostic tests (such as residual normality test, autocorrelation and white heteroskedasticity) was involved to check in order to check the estimated model.

## **Chapter 4**

### **DATA ANALYSIS, RESULTS AND FINDINGS**

#### **4.1 Introduction**

This section focuses on the data presentation, data analysis and discussion of the research findings from the various econometric tests and model estimations performed in this research as outlined in section 3.1 of the research design. This section thus, draws attention to the research findings in relation to the research objectives which strive at fulfilling the main aim of the study: To investigate the relationship between employment and GDP (Gross Domestic Product) in South Africa between 1994 and 2014.

#### **4.2 Economic growth**

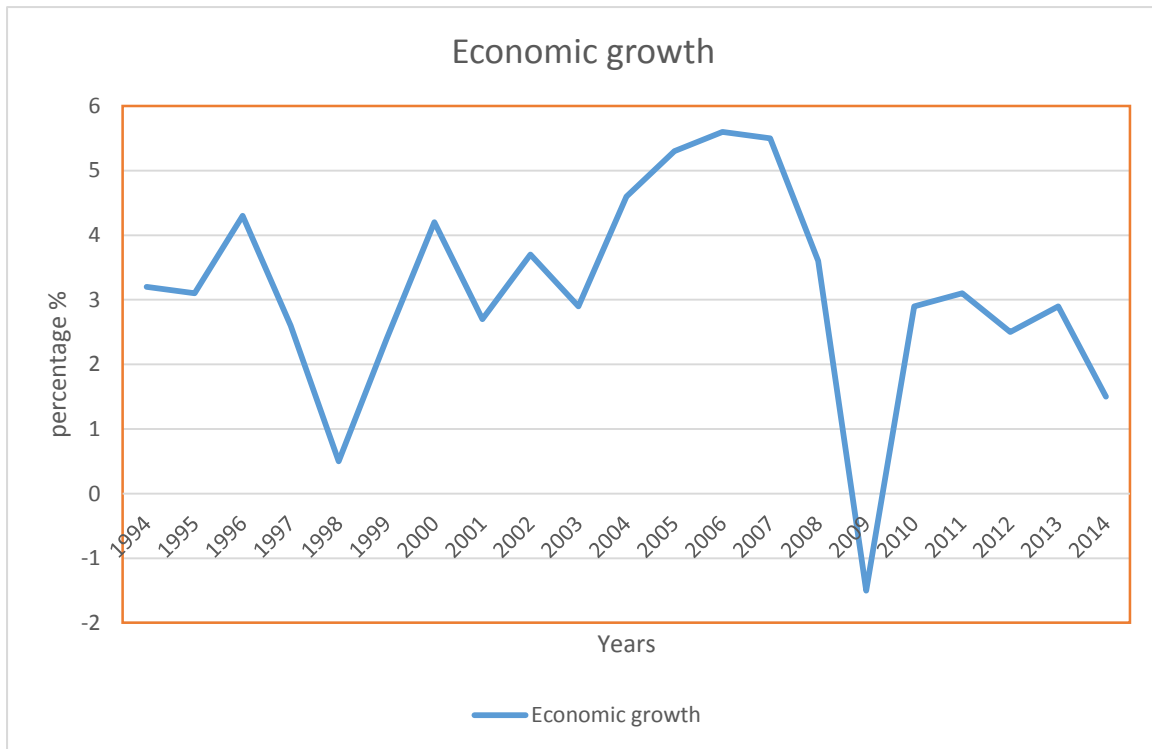


FIGURE 4.1

Economic growth in South Africa has been fluctuating for the period under study. In 1998 economic growth of South Africa declined because of the Asian financial crisis and from 1999 the economic growth started to pick up. In 2000-2001 the South African economy was strengthened by the announcement of the adoption of the new policy or strategy called inflation targeting by South African Reserve Bank (SARB).

The introduction of inflation targeting has been successful when it comes to the stabilizing of the economy, boosting the confident of investors and also when it comes to the matter of the exchange rate. The reason why inflation targeting is successful is because it reduces the inflationary expectation that might directly translate into inflation (Nattrass, Wakeford and Muradzikwa, 2000).

In 2004 the South African government introduced the Accelerated and Shared Growth Initiative South African (ASGISA) with the aim of increasing the GDP or economic growth above 6 % mark by 2010, (IMF, 2006; HDR, 2009), in 2005/2006 fiscal year or financial year of South African government, the South African



government recorded the lowest budget deficit of about 0.5 % and in 2007/ 2008 they recorded 0.6 % of GDP as the highest budget surplus.

The ASGISA policy has failed to reach the target of 6 % and above, but the increase in the real GDP growth in 2007/2008 has increased productivity, strengthened public finance etc. Due to the world financial crises in 2008, the South African economic growth or GDP decreased from 3.6 % to -1.5 % in 2009. The real GDP of South Africa increased from -1.5% to 3.5% from 2009 to 2010.

According to the SARB (2011), this was because of the low interest rate (inflation targeting), faster global economic growth, strong commodity price and the 2010 FIFA world cup. Since 2013 the GDP or economic growth of the country has been declining. The way the economy grows, it will difficult to produce 11 million jobs by 2030 as is outlined in the national development plan (NDP).

#### **4.3 Employment analysis**

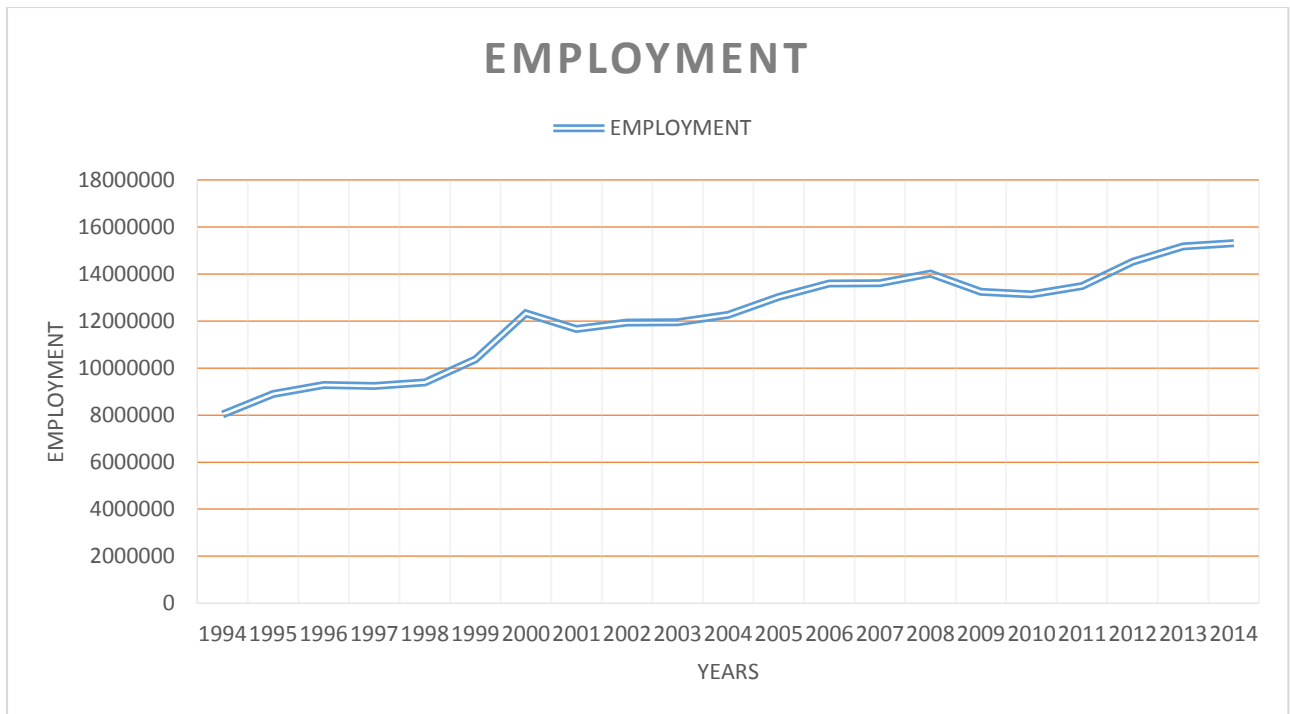


FIGURE 4.2

The above figure shows the total number of people employed since 1994 (democracy) to 2014 in South Africa. The data or the line graph shows that the employment has been increasing since 1994 to 2014 even if the increment is not convincing. Since the democracy in 1994, the main focus of government was to ensure that there is full employment in South Africa even if it is impossible. Now the focus of South Africans is 2030 (according to the national development policy). According to the policy (NDP), government will create eleven (11) million jobs by 2030. But according to the above curve it show that it will be difficult for the government to do so. The reason being that they failed to create six (6) million jobs since the democracy in 1994 up to 2014(which is 20 years from 1994 to 2014).

#### 4.4 Unit root test

The results of the unit root test are presented in table 4.1. These results are composed of the ADF test and the Phillips-Perron test. The Phillips-Perron test is used to verify the results obtained from the ADF test. Both tests are tested at a 1%, 5% and 10% level of significance and are based on trend and intercept, intercept and none. A maximum of 3 lags are used in the ADF test while a fixed number of 3 lags are used in the Philips-Perron test. The variables LEmployment and LGDP indicate level form while DLEmployment and DLGDP indicate first difference. All the

variables in the model are non-stationary in level form. However all variables differ at first difference. Although the interest rate appears to be stationary in level form at trend and intercept, the Phillips-Perron test confirms a non stationary state. Figure 3 shows Lemployment is not stationary because its mean does not hover along zero on the X-axis but when differenced (Deployment), the mean hovers along zero, indicating stationarity.

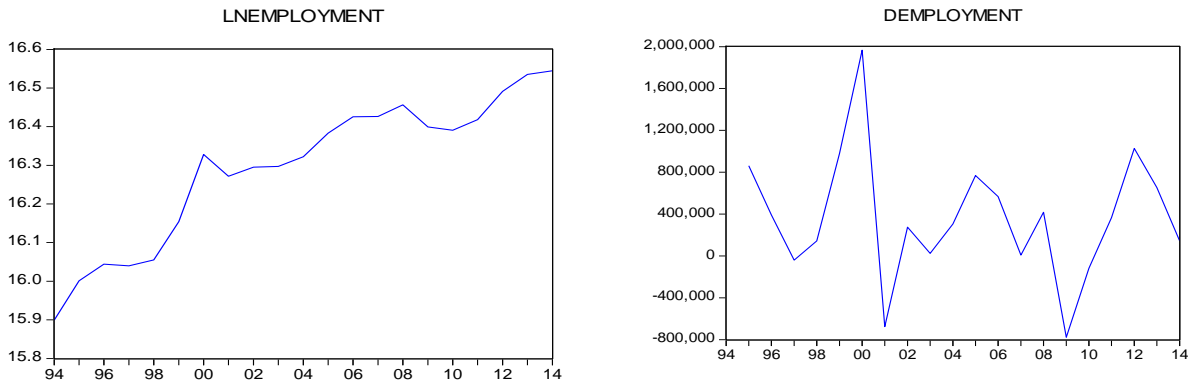


Figure 4.3 Employment in level form

(Lnemployment) and at first difference (Dlnemployment)

On figure 4.3 above, LnEMPLOYMENT appears not to be stationary because the mean does oscillate around zero on the X-axis. However, DlnEMPLOYMENT becomes stationary after being differenced (DlnEMPLOYMENT). This can be noted by a mean that is oscillating along zero on the X-axis which therefore, which indicates stationarity.

Gross Domestic Product in Level form (LNGDP) and at first difference (DLGDP)

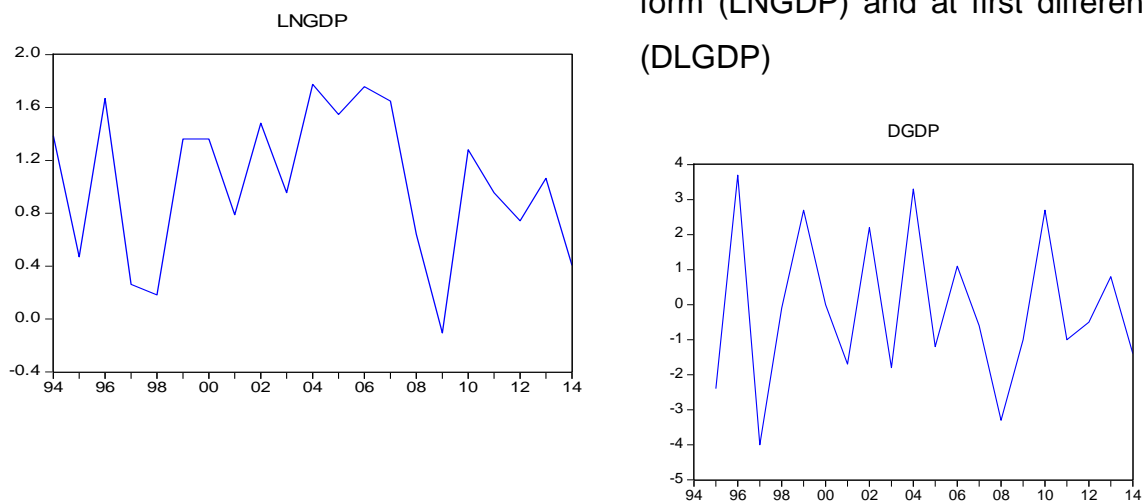


Figure 4.4

In figure 4.4 above, LGDP appears not to be stationary because the mean does oscillate around zero on the X-axis. However, DGDP becomes stationary after being differenced (DGDP). This can be noted by a mean that is oscillating along zero on the X-axis which therefore indicates stationarity.

**Table 4.1:** Result of Unit Root Test

SERIES	MODEL	LAGS	ADF TEST
LGDP	$t_t$	0	-3.965955***
	$t_u$	0	-3.859882**
	t	1	-0.911599
DLGDP	$t_t$	0	-7.346797***
	$t_u$	0	-7.215643***
	t	0	-7.559033***
LEMPLOYMENT	$t_t$	0	-1.888510
	$t_u$	0	-2.372496
	t	0	2.681716***
DEMPLOYMENT	$t_t$	0	-4.182158***
	$t_u$	0	-4.073223**
	t	0	-3.425860***

**Source:** Author

**NB:**

- Ho: Series has a unit root

-Asterisk (\*) represents the rejection of the null hypothesis (Ho) at the different level of --significance (1%, 5% and 10%)

-  $t_t$  - Trend & Intercept;  $t_u$  - Intercept; t- None

#### 4.1.1 Phillip Perron

Inemployment	intercept	-2.79078*
	Trend and intercept	-2.383474
	none	-3.455193***
Dlnemployment	intercept	-4.3678411***
	Trend and intercept	-4.798101***
	none	-3.483026***

#### 4.1.2 Phillip Perron

lnGDP	intercept	-3.965955***
	Trend and intercept	-3.859882**
	none	-1.607663*
DlnGDP	intercept	-13.26371***
	Trend and intercept	-18.19893***
	none	-13.67683***

The results of the unit root test are presented in table 1 above. These results are composed of the ADF unit root test. The test is tested at a 1%, 5% and 10% level of significance and is based on trend and intercept, intercept and none. A maximum of 6 lags are used in the ADF test. The variables LGDP and LEMPLOYMENT indicate level form while DGDP and DEMPLOYMENT indicate first difference. Some of the variables in the model are non-stationary in level form. However, all variables become stationary at first difference.

#### 4.5 CASUALITY TEST

The result of the Granger causality test is presented in table 4.3 below. The first direction of causality runs from GDP to Employment. The result shows that P- value is smaller than the level of significance (5%). Thus, we reject Ho. This implies that GDP predicts employment in South Africa.

The second direction of causality runs from Employment to GDP (Gross Domestic Product). The result shows that P- value (probability value) is greater than the level

of significant (5%). Therefore, we don't reject Ho. This implies that employment does not predict GDP in South Africa.

Table 4.3

Pairwise Granger Causality Tests  
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNEMPLOYMENT	19	1.15245	0.0382
LNEMPLOYMENT does not Granger Cause LNGDP		0.10550	0.4406

**Note:** Reject Ho if P-value < L.O.S; Do not reject Ho if P-value > L.O.S

Source: Author

#### 4.6 VAR

TABLE 4.4  
VAR Lag Order Selection Criteria  
Included observations: 20

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8.944343	NA	0.010243	1.094434	1.194008	1.113872
1	17.56383	45.06389*	0.001083*	-1.156383*	-0.857663*	-1.098070*

\* indicates lag order selected by the criterion

The table above indicates that 1 lag criterion has been selected. Therefore, a decision to adopt 1 lag can be made since the information criteria tactic produced well-disposed results. The Johannes co-integration test will be piloted using 1 lag for the VAR.

#### 4.7 Co-integration (APPENDIX B)

Table 4.5

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.681454	19.96532	15.49471	0.0099
At most 1	0.029983	0.517514	3.841466	0.4719

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.681454	19.44780	14.26460	0.0069
At most 1	0.029983	0.517514	3.841466	0.4719

Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Trace analysis

The above information (table 4.3) indicates that there is at least one (1) co-integration equation at the 0.05 level. Reject the null hypothesis of no co-integration vectors at none. The reason for the rejection of the null hypothesis at none is because the trace or t statistic of 19.96532 is greater than the 5 % critical value of 15.49471. At most one (1) we do not reject the null hypothesis because the trace or t statistic is less than the 5 % critical value.

#### Maximum eigenvalue

The above information (table 4.4) indicate that there is at least one (1) co-integration equation at the 0.05 level. Reject the null hypothesis of no co-integration vectors at none. The reason for the rejection of the null hypothesis at none is because the maximum eigenvalue of 19.44780 is greater than the 5 % critical value of 14.26460. At most one (1) we do not reject the null hypothesis because the maximum eigenvalue of 1.184366 is less than the 5 % critical value 3.841466. Therefore, we conclude that there is one significant long run relationship between employment and economic growth.

#### Normalized co-integrating coefficients (standard error in parentheses)

LINEmp	LINGDP
1.000000	0.080298
	(0.10939)

Adjustment coefficients (standard error in parentheses)

D(LINEmp) -0.219251

(0.07973)  
D(LINGDP) -2.452320  
(0.78091)

---

The normalised co-integrating coefficients show that there is a positive relationship between employment and economic growth in South Africa. This is indicated by 0.080298 or 8 % from LINGDP. This means that when the GDP increases the employment also increases in South Africa.

The speed of adjustment in this case is -0.219251 (this indicated that if there is deviation from equilibrium. Only 21, 9251 percent is corrected in one year as the variable moves towards restoring the equilibrium level). This shows that the speed of adjustment is approximately 21.9251. The negative sign shows that even if the can be a shock in the economy, the speed of adjustment is still able to restore to equilibrium level. This indicated that employment has no strong pressure from restoring in the long run whenever there is a shock or disturbance in the economy. The t- value (appendix VEC) of the speed of adjustment is -2.75000 which is statistically significant.

The low speed of adjustment by employment may reflect the existence of some factors affecting employment in South Africa other than GDP.

**Vector Error Correction Model**

The discovery of at least one co-entegration equation in the previous section implies that a VECM can be used. This allows us to distinguish between the short and long term effects of variables.

**Long Run Terms**

Summary of the long term parameters in the model is reported in Table 4.7 below (see Appendix 5(c)).

**Table 4.7 Results of Long Run Co-entegration Equation**

Variable	Coefficient	Standard error	t-statistic
Constant	16.41828	-	-
EMPLOYMENT	1.000000	-	-
GDP	0.080298	0.10939	0.73407





The long term impact of the explanatory variables on employment as shown in table 4.7 is illustrated using equation 5.1:

$$\text{Employment} = 16.41828 + 0.080298 \text{ GDP} \dots\dots\dots 1$$

Equation 1 shows that GDP have a positive long run relationship with GDP. GDP explanatory variables are statistically significant in explaining Employment since they have absolute t-values greater than 2.

Change in y/change in x  $0.080298 \times 10/100 = 8.0298$  this means that if there is 10% increase in GDP this will lead to 8.0298 increase in employment this also indicates that there is a positive relationship between GDP and employment hence these variables will move in the same direction. Therefore, overall, these results show that there is a significant positive impact of GDP on employment of the country in the long run. Even the theory suggest that the positive relationship between these two macroeconomic variables. The above results show that in the long run in South Africa there is also a positive relationship between these macro economic variables.

### Short Run Terms and speed of adjustment

The speed of adjustment is indicated by the coefficients of the error correction terms. Results from the error correction model are presented in Table 4.8 (see Appendix 5b).

**Table 5.6 Error Correction Results**

Variable	Coefficient	Standard Error	t-statistic
<b>EMPLOYMENT</b>	0.219251	0.07973	2.75000
<b>GDP</b>	2.452320	0.78091	3.14034

The lag of LGDP is found to have a positive effect on Employment in the short-run. However the t- value of 3.14034 is significant. The coefficient shows that current employment can increase by 24,52320 per cent if GDP is increased by 3 per cent.

This shows that the exogenous component of GDP exerts a reliable, positive impact on Employment.

### **THE WALD TEST**

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	4.317160	(2, 9)	0.0485
Chi-square	8.634320	2	0.0133

Null Hypothesis:  $C(5)=C(4)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	0.056740	0.023512
C(4)	-0.441941	0.220275

Restrictions are linear in coefficients.

The Wald test shows that there is a short run relationship between economic growth and employment. The above diagram shows that the combination of C(5) and C(4) is significant because the probability is below the level of significant (LOS) at 5 percent. The probability on the above diagram is 0.0133, which is 1,33 percent.

### **4. 8 Diagnostic test** (APPENDIX A)

**Table 4.7**

TEST	H0	T-STATISTIC	P-VALUE	COCLUSION
Jarque-Bera	<b>Residuals are normally distributed</b>	<b>1.381621</b>	<b>0.501170</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, residuals are normally distributed</b>
Ljung-Box Q	<b>No Serial correlation (Order 6)</b>	<b>0.8859</b>	<b>0.990</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, there is no serial correlation in</b>

				the model
Breusch-Godfrey	<b>No Serial correlation</b>	<b>0.026949</b>	<b>0.9866</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, there is no serial correlation in the model</b>
Arch	<b>No ARCH Heteroskedasticity</b>	<b>0.101384</b>	<b>0.7502</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, there is no heteroskedasticity in the model</b>
White (NCT)	<b>No Heteroskedasticity</b>	<b>0.200814</b>	<b>0.6541</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, there is no heteroskedasticity in the model</b>
White (CT)	<b>No Heteroskedasticity</b>	<b>0.229482</b>	<b>0.8916</b>	<b>Do not reject Ho since PV &gt; L.O.S. Hence, there is no heteroskedasticity in the model</b>

The results of the diagnostic tests are presented in table 4.7 above. These results are tested based on the level of significance (L.O.S) at 1%, 5% and 10%. As can be noted from the table, the Jarque-Bera (APPENDIX A) test indicates that the residuals of the regression are normally distributed in the model because the p-value of 0.990 is greater than all three levels of significance.

The Ljung-Box Q test (APPENDIX A) of order (6) indicates that the model does not contain serial correlation and this is evidenced by the fact that, the p-value of 0.501 is greater than all three levels of significance. However, the Breusch-Godfrey test indicates that elements of serial correlation are not present in the model at 5% and 10% level of significance. According to this test, the model is, however, free from serial correlation at 5% level of significance compared against a p-value of 99%.

The ARCH (Auto Regressive Conditional Heteroskedasticity) test (APPENDIX A) is performed with a number of 2 lags and thus, shows that the errors are homoskedastic. This can be seen by a greater p-value of 0.7502 as compared to the three levels of significance. The white test (NCT) with “no cross terms”, and that with “cross terms” (CT) (APPENDIX A) also confirms that the errors do not exhibit heteroskedasticity. This is evidenced by the p-values of 0.6541 and 0.8916 which are compared against the levels of significance at 1%, 5% and 10%.

Table 4.8

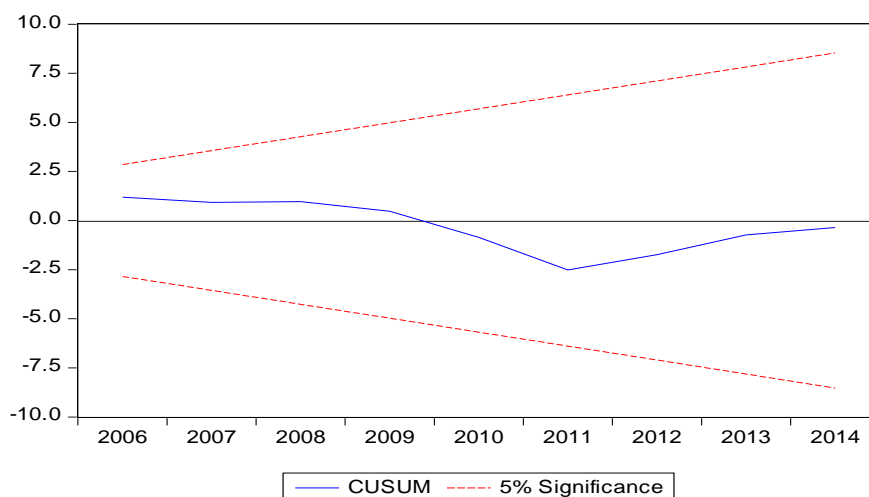
**Ramsey test**

Test	H0	t-statistic	P value	CONCLUSION
Ramsey RESET	<b>Equation is correctly specified</b>	<b>0.920724</b>	<b>0.3373</b>	<b>Do not reject Ho since PV&gt;L.O.S. Hence, equation is correctly specified</b>

In table 4.8 above, the result of the stability test is presented. As can be seen from the table, the Ramsey RESET (APPENDIX A) indicates that the equation is correctly specified. This is evidenced by a p-value of 0.3373 which is greater than a 10% level of significance. Therefore, the model is worthy to be analysed.

**The cusum test**

The cusum test is another test that be used to test the if the equation is correctly specified or is of good fit.



The cusum test shows that the model is of good fit or the equation is correctly specified in this study. This is indicated by the cusum line (blue line) which is in between the level of significant (5 %) (those two red lines).

## **Conclusion**

The main aim of this chapter was to examine the relationship between two most important macroeconomics variables namely: economic growth and employment in South Africa. The data indicated that variable are stationery in the first level or difference and there is cointegration relationship between economic growth and employment. The VEC model indicated that there is positive relationship between economic growth and employment in South Africa both in the long and short run. This indicate that the policy maker need to make sure that they implement policies that will lead to an increase in the economic growth of the country because the model shows that there is a positive relationship between economic growth and employment (this means increase in the economic growth will lead to an increase in the employment in South Africa).

## CHAPTER 5

### Conclusion and recommendation

#### 5.1 Conclusion

The main aim of the paper or report was to determine the relationship between employment and economic growth in South Africa from 1994 to 2014. The study used a number of econometrics techniques to determine or to test the relationship between these two macroeconomic variables (employment and economic growth) in South Africa. Even if there are other factors that influence (e.g. FDI and inflation) the level of employment according to Marelli et al. (2014) and Mishkin (2001). The research did not consider those factors when doing the analysis since the researcher wanted to know the relationship between economic growth and employment. Econometric techniques such as error correction, co-integration and Granger causality were used to test the long run equilibrium and causal relationship direction in the long and short run. The result shows that there is direction causality running from economic growth to employment.

This indicates that policy makers or the South Africa government must ensure that there is economic growth in South Africa because of the positive relationship between employment and economic growth in both short and long run. Seyfried and Collage (2008) also did the same study and they obtained the same results. But the study by Sodipe and Ogunrinola (2011) in Nigeria found that there is an inverse relationship between employment and economic growth. In other words in South Africa the more the economy grows the more the job opportunities will exist in the country in both short and long run in South Africa.

#### 5.2 Recommendations

Since the study indicated the positive relationship between economics growth and employment in the short run and in the long run, this shows that in the short run and in the long run the economy is running well. The government must look at other variables that will increase the GDP of the country. For example the government can lower the real wages, corporate tax rates as well as other measures (labour policies) or they should not discriminate between foreign and domestic investors. By doing

so, this will encourage FDI. An increase in FDI in the country will lead to an increase in the GDP and in turn it will increase the job opportunities or increase the employment.

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## Appendices

### Appendix A

#### RAMSEY TEST

Ramsey RESET Test:

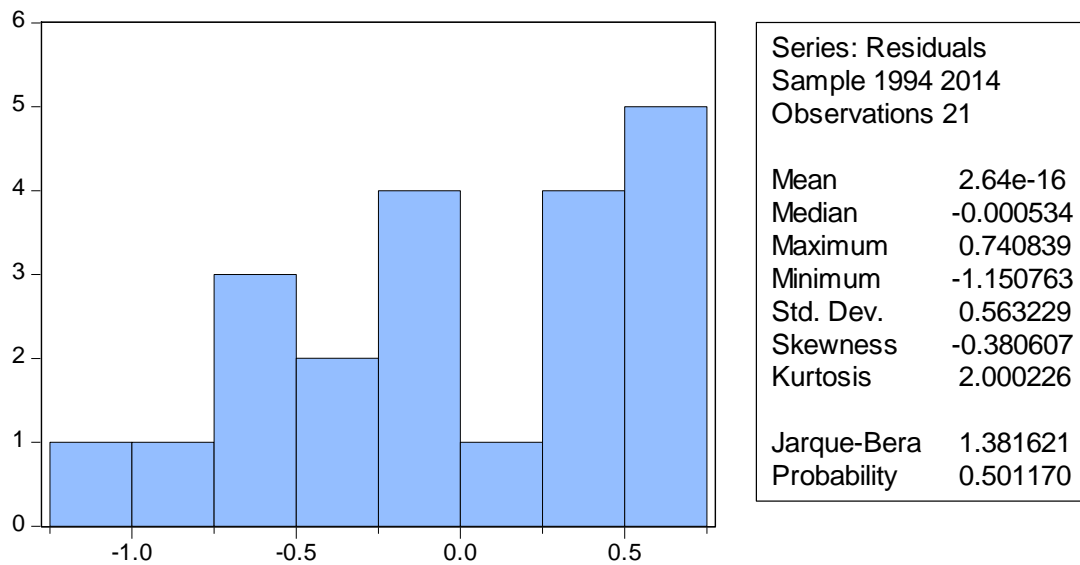
F-statistic	0.806748	Prob. F(1,18)	0.3809
Log likelihood ratio	0.920724	Prob. Chi-Square(1)	0.3373

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-659.4098	732.7340	-0.899931	0.3800
LNGDP	51.80795	57.52169	0.900668	0.3797
FITTED^2	-173.0600	192.6760	-0.898192	0.3809

R-squared	0.045187	Mean dependent var	1.030014
Adjusted R-squared	-0.060903	S.D. dependent var	0.563904
S.E. of regression	0.580822	Akaike info criterion	1.882818
Sum squared resid	6.072370	Schwarz criterion	2.032035
Log likelihood	-16.76959	Hannan-Quinn criter.	1.915202
F-statistic	0.425933	Durbin-Watson stat	1.938438
Prob(F-statistic)	0.659574		



## JARQUE-BERA



## Breusch-Godfrey

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.010922	Prob. F(2,17)	0.9891
Obs*R-squared	0.026949	Prob. Chi-Square(2)	0.9866

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.184142	11.86124	0.015525	0.9878
LNGDP	-0.011355	0.727960	-0.015598	0.9877
RESID(-1)	0.036632	0.253369	0.144580	0.8867
RESID(-2)	-0.008815	0.251804	-0.035008	0.9725

R-squared	0.001283	Mean dependent var	2.64E-16
Adjusted R-squared	-0.174961	S.D. dependent var	0.563229
S.E. of regression	0.610515	Akaike info criterion	2.020616
Sum squared resid	6.336388	Schwarz criterion	2.219573
Log likelihood	-17.21647	Hannan-Quinn criter.	2.063795
F-statistic	0.007281	Durbin-Watson stat	1.903460
Prob(F-statistic)	0.999111		

## WHITE INCLUDE CROSS TERMS

Heteroskedasticity Test: White

F-statistic	0.099436	Prob. F(2,18)	0.9058
Obs*R-squared	0.229482	Prob. Chi-Square(2)	0.8916

Scaled explained SS 0.093947 Prob. Chi-Square(2) 0.9541

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-93.90742	606.0300	-0.154955	0.8786
LNGDP	11.76866	74.66479	0.157620	0.8765
LNGDP^2	-0.367377	2.299469	-0.159766	0.8748
R-squared	0.010928	Mean dependent var		0.302120
Adjusted R-squared	-0.098969	S.D. dependent var		0.309616
S.E. of regression	0.324576	Akaike info criterion		0.718971
Sum squared resid	1.896294	Schwarz criterion		0.868188
Log likelihood	-4.549191	Hannan-Quinn criter.		0.751355
F-statistic	0.099436	Durbin-Watson stat		2.129020
Prob(F-statistic)	0.905842			

## WHITE EXCLUDING CROSS TERMS

Heteroskedasticity Test: White

F-statistic	0.183443	Prob. F(1,19)	0.6732
Obs*R-squared	0.200814	Prob. Chi-Square(1)	0.6541
Scaled explained SS	0.082211	Prob. Chi-Square(1)	0.7743

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.613738	3.063139	0.526825	0.6044
LNGDP^2	-0.004940	0.011533	-0.428302	0.6732
R-squared	0.009563	Mean dependent var		0.302120
Adjusted R-squared	-0.042566	S.D. dependent var		0.309616
S.E. of regression	0.316137	Akaike info criterion		0.625112
Sum squared resid	1.898912	Schwarz criterion		0.724590
Log likelihood	-4.563674	Hannan-Quinn criter.		0.646701
F-statistic	0.183443	Durbin-Watson stat		2.131482
Prob(F-statistic)	0.673247			

## ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.091711	Prob. F(1,18)	0.7655
Obs*R-squared	0.101384	Prob. Chi-Square(1)	0.7502

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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C	0.329693	0.100372	3.284726	0.0041
RESID^2(-1)	-0.071221	0.235178	-0.302838	0.7655
R-squared	0.005069	Mean dependent var	0.308656	
Adjusted R-squared	-0.050205	S.D. dependent var	0.316170	
S.E. of regression	0.324009	Akaike info criterion	0.678550	
Sum squared resid	1.889676	Schwarz criterion	0.778123	
Log likelihood	-4.785501	Hannan-Quinn criter.	0.697988	
F-statistic	0.091711	Durbin-Watson stat	2.003189	
Prob(F-statistic)	0.765485			

### Ljung-Box Q

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
.   .	.   .	1 0.033	0.033	0.0268	0.870
.   .	.   .	2 -0.007	-0.008	0.0281	0.986
.  * .	.  * .	3 0.074	0.075	0.1749	0.982
. *  .	. *  .	4 -0.145	-0.151	0.7726	0.942
.   .	.   .	5 -0.019	-0.006	0.7839	0.978
.   .	.   .	6 0.056	0.050	0.8859	0.990
. **  .	. **  .	7 -0.308	-0.300	4.1575	0.761
. *  .	. *  .	8 -0.072	-0.068	4.3515	0.824
. **  .	. ***  .	9 -0.316	-0.370	8.3797	0.496
. *  .	.   .	10 -0.082	-0.023	8.6718	0.564
.  ** .	.  * .	11 0.262	0.200	11.980	0.365
.   .	.   .	12 -0.013	-0.040	11.989	0.447

## **Appendix B**

### **CO-INTEGRATION ANALYSIS**

#### Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.681454	19.96532	15.49471	0.0099
At most 1	0.029983	0.517514	3.841466	0.4719

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.681454	19.44780	14.26460	0.0069
At most 1	0.029983	0.517514	3.841466	0.4719

Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integrating Coefficients (normalized by  $b'S_{11}^{-1}b=I$ ):

LINUNE	LINGDP
7.226191	0.580245
5.135718	3.842710

---

Unrestricted Adjustment Coefficients (alpha):

D(LINUNE)	0.030341	-0.004466
D(LINGDP)	0.339366	0.039208

---

1	Co-integrating	Log	
Equation(s):		likelihood	28.92304
Normalized	co-integrating	coefficients	(standard error in
parentheses)			
LINUNE	LINGDP		
1.000000	0.080298		
	(0.10939)		

Adjustment coefficients (standard error in parentheses)

D(LINUNE)	-0.219251
	(0.07973)
D(LINGDP)	-2.452320
	(0.78091)

---

## Appendix C

### Vector Error Correction Estimates

Included observations: 17 after adjustments  
Standard errors in ( ) & t-statistics in [ ]

Co-integrating Eq:	CointEq1	
LINUNE(-1)	1.000000	
LINGDP(-1)	0.080298 (0.10939) [ 0.73407]	
C	16.41828	

Error Correction:	D(LINUNE)	D(LINGDP)
CointEq1	0.219251 (0.07973) [2.75000]	2.452320 (0.78091) [3.14034]
D(LINUNE(-1))	-0.254068 (0.27404) [-0.92713]	-3.789428 (2.68410) [-1.41181]
D(LINUNE(-2))	-0.023725 (0.25659) [-0.09246]	2.002493 (2.51325) [ 0.79678]

D(LINUNE(-3))	-0.441941 (0.22028) [-2.00631]	-7.221458 (2.15753) [-3.34710]
D(LINGDP(-1))	0.056740 (0.02351) [ 2.41328]	-0.055171 (0.23029) [-0.23957]
D(LINGDP(-2))	0.016162 (0.02544) [ 0.63524]	-0.266859 (0.24919) [-1.07089]
D(LINGDP(-3))	0.010814 (0.02063) [ 0.52410]	0.168176 (0.20210) [ 0.83215]
C	0.053237 (0.01785) [ 2.98167]	0.287108 (0.17488) [ 1.64173]
R-squared	0.608049	0.759933
Adj. R-squared	0.303198	0.573214
Sum sq. resids	0.018625	1.786791
S.E. equation	0.045491	0.445570
F-statistic	1.994576	4.069925
Log likelihood	33.81806	-4.973221
Akaike AIC	-3.037419	1.526261
Schwarz SC	-2.645319	1.918362
Mean dependent	0.029698	0.008418
S.D. dependent	0.054497	0.682041
Determinant resid covariance (dof adj.)		0.000407
Determinant resid covariance		0.000114
Log likelihood		28.92304
Akaike information criterion		-1.285064
Schwarz criterion		-0.402838

**USING THE PROBABILITY VALUES TO ANALYSIS (SHORT RUN RELATIONSHIP).**

Dependent Variable: D(LINUNE)

Method: Least Squares

Date: 09/29/15 Time: 14:52

Sample (adjusted): 1998 2014

Included observations: 17 after adjustments

D(LINUNE) = C(1)\*( LINUNE(-1) +  
0.0802975277698\*LINGDP(-1) -

$$\begin{aligned}
 & 16.4182760663 \quad ) \quad + \quad C(2)*D(LINUNE(-1)) \quad + \\
 & C(3)*D(LINUNE(-2)) + C(4) \\
 & *D(LINUNE(-3)) \quad + \quad C(5)*D(LINGDP(-1)) \quad + \\
 & C(6)*D(LINGDP(-2)) + C(7) \\
 & *D(LINGDP(-3)) + C(8)
 \end{aligned}$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.219251	0.079728	-2.749995	0.0225
C(2)	-0.254068	0.274036	-0.927132	0.3781
C(3)	-0.023725	0.256593	-0.092461	0.9284
C(4)	-0.441941	0.220275	-2.006313	0.0758
C(5)	0.056740	0.023512	2.413276	0.0390
C(6)	0.016162	0.025442	0.635239	0.5411
C(7)	0.010814	0.020634	0.524097	0.6129
C(8)	0.053237	0.017855	2.981674	0.0154

R-squared	0.608049	Mean dependent var	0.029698
Adjusted R-squared	0.303198	S.D. dependent var	0.054497
S.E. of regression	0.045491	Akaike info criterion	-3.037419
Sum squared resid	0.018625	Schwarz criterion	-2.645319
Log likelihood	33.81806	Hannan-Quinn criter.	-2.998444
F-statistic	1.994576	Durbin-Watson stat	2.406902
Prob(F-statistic)	0.165186		

### The cusum test

