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THE DETERMINANTS OF ECONOMIC DIVERSIFICATION FROM A SUB-SAHARAN AFRICA PERSPECTIVE

By

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(322222)

A dissertation submitted towards the fulfilment of the requirement for a Master of Commerce degree by research in the field of Economics, at the University of the Witwatersrand.

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March 2017

DECLARATION

I declare that: *The determinants of economic diversification from a Sub-Saharan Africa perspective*, is my own work. This dissertation has not been submitted for any degree or examination in any university, and that all the sources that I have used or quoted have been indicated and acknowledged by complete references.

Stanley Masilo

Signature: S.C.S. MASILO

Date: 30 March 2017

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A special acknowledgement to all the scholars that I have referenced in this study, because your knowledge has contributed tremendously to my personal growth. I hope that this dissertation will provide enlightenment and inspiration for further research towards achieving a tangible African Renaissance.

ABSTRACT

Sub-Saharan Africa (SSA) is poor even though it has vast natural resources, is a paradox which various scholars have studied from different points of view. Furthermore, this region has a tendency to be highly reliant on narrow natural resource export baskets which are susceptible to external shocks and mineral depletion. Thus, economic diversification is a development path that can propel SSA economies to develop broad export baskets that are not highly dependent on natural resources, in order to mitigate systemic risk that stems from volatile commodity prices and achieve long-term sustainability.

The research objectives of this study are twofold. Firstly, it determines the extent of economic diversification of selected SSA economies. Secondly, this study investigates the main determinants of economic diversification. The hypothesis of this study is based on the premise that there is a statistically significant relationship between economic diversification and government quality. Government quality is an important determinant of economic diversification due to its influence on macroeconomic fundamentals, infrastructure development, public goods and services. Furthermore, government formulates national development plans which can create a conducive environment for economic diversification to take place. The main policy recommendations towards achieving economic diversification from a SSA perspective, are encapsulated by the following aspects: structural reform and Group Economics.

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LIST OF ABBRREVIATIONS

BEAC	Business and Economic Advisory Council
CC	Control of Corruption
CPI	Corruption Perception Index
CPIA	Country Policy and Institutional Assessment
DTF	Distance to Frontier
DRC	Democratic Republic of Congo
FEM	Fixed Effect Model
FOA	Food and Agricultural Organisation of the United Nations
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GE	Government Effectiveness
GS	Gross Savings
GQ	Government Quality
HDI	Human Development Index
IHS	Information Handling Services
IMF	International Monetary Fund
NDP	National Development Plan
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
OPEC	Organisation of the Petroleum Exporting Countries
PS	Political Stability
REM	Random Effects Model
RL	Rule of Law

RQ	Regulatory Quality
SAPs	Structural Adjustment Programmes
SSA	Sub-Saharan Africa
SWF	Sovereign Wealth Fund
S&P	Standard & Poor's
UNDP	United Nations Development Programme
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organisation
VA	Voice and Accountability

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CHAPTER ONE: INTRODUCTION

1.1 Background

Sub-Saharan Africa (SSA) economies are highly reliant on natural resources for real Gross Domestic Product (GDP) growth, fiscal revenue and export receipts. Natural resources in SSA consist of the following two factors: mineral commodities and agricultural produce which grows on the rich arable land[1]. For example, petroleum exports in Nigeria contribute more than 90% of total exports revenue, which translates to 35% of GDP (Organisation of the Petroleum Exporting Countries, 2016). Tanzania on the other hand, is an agrarian economy because agricultural produce[2] contributes approximately 50% of the country's GDP (Bohlund, 2015).

Both types of natural resources are susceptible to external shocks, which impede sustainable economic development. External shocks that SSA economies are confronted with include weather fluctuations and volatile commodity prices, due to boom-bust business cycles in international markets. In addition, natural resources tend to be a source of conflict, adverse rent-seeking behaviour, corruption and financial mismanagement (Ross, 1999; Collier & Hoeffler, 2005). SSA economies, based on their collective potential and natural resource endowments; are supposed to be wealthy from a socio-economic standpoint. However, this part of the world is synonymous with poverty, xenophobia, inferiority complex, high levels of income inequality, malnutrition and unemployment (see Fanon, 1961; Jonas, 2012; and Bain *et al.*, 2013).

Economic diversification is a developmental strategy which can be used to overcome the above challenges in respect of SSA economies. According to Bhaskaran (2007), economic diversification is defined as a means of introducing wider and more diversified sources of income, export receipts, wealth, government revenue and employment generation. Strategy is a process of analysing a given situation and then developing a plan on how to overcome the problem, whether it is social or economic in nature (Lazenby, 2014). An effective economic diversification strategy strives to mitigate systemic risk in an economy so that the positive growth of other sectors (e.g. manufacturing) neutralises the adverse performance of natural resources during a bust cycle (e.g. decline in oil prices). In essence, economic diversification is a strategy that mitigates the systemic risk which is prevalent in SSA economies because they are highly dependent on a specific natural resource sector for long-term real GDP growth and sustainability.

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[1] It is important to note that mineral commodities are non-renewable natural resources (e.g. diamonds, gold, crude oil, platinum and copper). Agricultural produce is categorised as a renewable natural resource (e.g. fruits, vegetables, livestock and various cash crops). For more insight, please refer to African Development Bank (2007) and Chauvin *et al.* (2012).

[2] Tanzania is dependent on the following agricultural produce for its economic growth: coffee, tea, cotton, tobacco, sisal and cashew nuts (Bohlund, 2015).

In order to implement effective economic diversification strategies, certain determinants need to be in place. These determinants include: good governance, political will, macroeconomic stability, education, intra-Africa trade, physical infrastructure, business friendly environment, and savings and investments which yield positive returns for all stakeholders[3] (Organisation for Economic Co-operation and Development, 2011). The importance of effective economic diversification strategy implementation is that it will contribute positively in terms of Africa's liberation from socio-economic underdevelopment and poverty. This study investigates the determinants of economic diversification from a SSA perspective.

1.2 Research questions

From a SSA perspective, this study aims to provide insight on the following research questions:

- How is economic diversification measured?
- What is the extent of economic diversification in selected SSA economies?
- What are the main determinants of economic diversification?

1.3 Research objectives

The main objective of this study is to investigate the determinants of economic diversification. In order to achieve this objective, the following topics will be discussed:

- Determine the extent of economic diversification in selected SSA economies.
- Investigate the main determinants of economic diversification in selected SSA economies.

1.4 Hypothesis

H_0: There is a statistically significant relationship between economic diversification and government quality.

H_1: There is no statistically significant relationship between economic diversification and government quality.

The above hypothesis of this study is based on three stylised facts. Firstly, an economy led by reputable leaders, good governance and strong institutions is more likely to achieve the mandate of long-term economic diversification strategies. SSA economies have high levels of poverty and underdevelopment mainly due to colonial exploitation, corrupt political elite post-colonisation and inadequate political will. Therefore, improving the quality of individuals who work in important public institutions and

[3] The key stakeholders include: the public sector, religious groups, trade unions, private sector and all Africans within the continent and the Diaspora.

increasing human development levels of the masses are essential economic diversification determinants. It is important to note that the quality of government is a key aspect that determines whether economic diversification strategies succeed or fail.

The second stylised fact is that countries with sub-investment grade credit ratings from Moody's, Fitch and Standard & Poor's (S&P) struggle to raise financial capital, which can be used to finance economic diversification determinants, such as transportation infrastructure and electricity power plants. Esanov (2014) argues that successful economic diversification requires substantial amounts of financial capital. From a SSA perspective, only Botswana, Namibia and South Africa have investment grade credit ratings (Ramkhelawan-Bhana & Fauconnier, 2015; Trade Economics, 2016). Besides analysing macroeconomic fundamentals, rating agencies also take into account the quality of government when they assign their sovereign credit ratings.

The third stylised fact is that a well-diversified economy is more sustainable and prosperous over the long-term. Economic diversification is thus an imperative developmental strategy that must be pursued effectively by SSA economies, which are highly dependent on a narrow basket of natural resources for fiscal revenue and real GDP growth. Government quality plays a major role in the macroeconomic fundamentals of its respective economy due to fiscal and monetary policies. Therefore, macroeconomic fundamentals must be analysed and improved with the end goal in mind, which is to develop well-diversified SSA economies that are resilient to external shocks.

1.5 Structure of study

This study will first commence with Chapter 2, which provides a conceptual and theoretical framework on the determinants of economic diversification. Chapter 3 is the section of this study which measures the quantitative extent of economic diversification of SSA's 20 largest economies[4]. Chapter 4 will provide insight on the panel regression model, which will be used to test the hypothesis of this study. Chapter 5 will analyse and interpret the panel regression models on the determinants which drive economic diversification. Lastly, Chapter 6 will provide policy recommendations and conclude this study on the determinants of economic diversification from a SSA perspective.

[4] According to World Bank (2015) the 20 largest SSA economies in terms of GDP include: Nigeria, South Africa, Angola, Sudan, Kenya, Ethiopia, Tanzania, Ghana, Democratic Republic of Congo (DRC), Côte d'Ivoire, Cameroon, Uganda, Zambia, Mozambique, Botswana, Gabon, Zimbabwe, Senegal, Mali and Namibia. Please refer to Table 15 (Chapter 4) for more insight.

CHAPTER TWO: CONCEPTUAL AND THEORETICAL FRAMEWORK

2.1 Introduction

SSA economies are different in terms of their natural resource endowment, language, colonial history and geographical landscape. However, economies in SSA do have commonalities, such as: corrupt leadership, inadequate economic diversification, high levels of poverty, 'resource curse', external shock vulnerability and low human development (Mosley, 1995; Demissie, 2014). Thus, it is essential to understand the rationale behind the importance of economic diversification based on a conceptual and theoretical framework.

This chapter outlines the theoretical arguments and economic theory in respect of the determinants of economic diversification. The topics that are articulated include an overview of underlying determinants, which either promote or constrain effective economic diversification strategies. Furthermore, the negative implications of the 'resource curse' and various socio-economic problems that impede sustainable long-term inclusive economic growth which alleviates poverty through effective economic diversification, will also be discussed.

2.2 Economic diversification overview

Economic diversification is a process of widening the spectrum of economic activities through industrialisation, in terms of the production and distribution of competitive products and services for long-term sustainability (Anyachie & Areji, 2015). SSA economies, such as Angola, Zambia and Tanzania are dependent on their respective natural resources which are susceptible to external shocks. Thus, an important rationale for economic diversification is that it creates a sustainable economy which is resilient to boom-bust cycles in commodity prices and weather fluctuations that adversely impact economic growth (Gelb, 2010). In essence, economic diversification is the transformation process of an economy from being overly reliant on natural resource production to diverse industrial manufacturing and tertiary sectors.

An effective economic diversification strategy should be based on the foundation of Maslow's Hierarchy of Needs[5] model because food, clothing, shelter, electricity, transport infrastructure and jobs are the pillars of a sustainable economy (Kaur, 2013). However, there is a shortage of these basic needs in SSA. According to Acemoglu & Robinson (2010), SSA is the poorest region in the world even though it is abundantly rich with vast natural resources. In addition, the World Bank (2014) poverty data approximates that 35% of the SSA population live in absolute poverty. One of the key reasons behind SSA's socio-economic woes is due to the mismanagement of natural resource revenues, which are

[5] For a more detailed analysis of Maslow's Hierarchy of Needs model, please read: "*Motivation and Personality*" (Maslow, 1954).

looted instead of being invested effectively towards building infrastructure and improving the business environment, so that non-resource sectors can flourish (African Development Bank, 2007).

Mineral commodities, such as crude oil and diamonds, are non-renewable which means their continued extraction will result in the complete depletion at a given point in time. According to the Commission of Geosciences, Environment and Resources (1996: 7) "sustainability and mineral resource development appear to be in conflict. Mining depletes finite resources and in a strict sense, therefore, is inherently unsustainable". Thus, SSA economies, such as Angola, Nigeria and Botswana, which are highly dependent on non-renewable natural resources, face systemic risk if they do not diversify their economies into other sectors (e.g. manufacturing, trade and services) for long-term economic growth.

Table 1: Depletion of non-renewable mineral commodities (crude oil)

Country	Proven crude oil reserves	Oil Production (barrels per day)	Oil Production (annually)	Estimated period before crude oil depletion
Angola	9.5 billion barrels	1.77 million	646 million barrels	15 years (2031)
Nigeria	37.2 billion barrels	2.2 million	803 million barrels	46 years (2062)

Sources: OPEC (2016) and IHS (2016). Please note that the estimated years before crude oil depletion are the author's calculations.

From Table 1, it can be observed that Angola and Nigeria will not have any crude oil reserves by, approximately, the year 2031 and 2062 respectively. The depletion of crude oil without other revenue streams to bolster sustainability will have a negative impact on fiscal revenue, poverty alleviation and real GDP growth for Angola and Nigeria. In terms of Botswana, the Centre for Applied Research and Econsult (2012), argue that the country's diamond abundance will be depleted by the year 2030. Basdevant (2008), based on International Monetary Fund insights, is of the view that diamond production in Botswana will come to an end approximately in 2029. Therefore, SSA economies which are highly dependent on non-renewable natural resources must diversify their economies as a matter of urgency in order to avoid adverse socio-economic ramifications that will be felt by future generations.

Economic diversification has advantages and disadvantages (Stanley & Bunnagi, 2001). An advantage of economic diversification is that it promotes the development of other lucrative sectors, which creates opportunities for increasing real GDP growth, employment and fiscal revenue (Romer, 1990). In addition, effective economic diversification results in an economy being less susceptible to devastating external shocks (Acemoglu & Zilibotti, 1997). A well-diversified economy has a number of different revenue streams which mitigate economic losses incurred during the boom-bust cycles of natural resource commodities. San (2006), argues that another advantage of economic diversification is the positive spill-over effect in terms of long-term economic growth, skills development, better standards of living and poverty alleviation. Zhang (2003), encapsulates the rationale for economic diversification in the following five factors: (1) mitigation of portfolio risk, (2) mineral resource depletion, (3)

improvement in terms of trade, (4) economies of scale in non-mineral sectors, and (5) lower price instability which is inherent within volatile commodity markets.

In contrast, the disadvantage of economic diversification is that it entails considerable economic costs in terms of high capital expenditure on physical infrastructure and human capital development (Koren & Tenreyro, 2003). Furthermore, economic diversification could lead to slow economic growth in the short-run if a given country is operating with limited resources and full employment. The rationale behind the anticipated slow economic growth over a short-run period is due to direct and indirect costs which are incurred from reallocating resources from a dominant natural resources sector to other diverse and sustainable non-resource sectors. Dwarka (2010), argues that economic diversification does not guarantee risk-return optimisation[6] even though it mitigates systemic risk of a primary-based economy, which is highly dependent on a cyclical natural resource sector.

2.3 The determinants of economic diversification

There are essential structures and attributes that must be in place, which create a conducive environment for effective economic diversification (Parteka & Tamberi, 2013; Elhiraika & Mbate, 2014). The Organisation for Economic Co-operation and Development (2011)[7] is of the view that there are six determinants that are essential to achieve economic diversification in Africa. The six determinants include: governance, natural resources, role of private sector, broader international framework, regional factors and finally, institutional capacity and human resources. If an economy does not possess an adequate supply of these essential economic diversification determinants, it would result in poor long-term economic growth, low productivity and misallocation of growth promoting resources (Young, 1973). This section discusses the main determinants which create a conducive environment for economic diversification from a SSA perspective.

2.3.1 Governance

Confucius[8] articulated the following profound quotable, "In a country well governed, poverty is something to be ashamed of. In a country badly governed, wealth is something to be ashamed of" (Nalla & Sumad, 2014: 7). The government of an economy and its institutions are the most imperative determinant on whether economic diversification strategies succeed or fail (see Wohlmuth, 1998; Spence & Brady, 2010; Nkurayija, 2011). Political will from government creates and implements economic diversification strategies. Furthermore, it is the government that collects taxes and decides

[6] A hypothetical example is the best way to explain risk and return optimisation. For instance, a given government takes a risk by investing US$2 billion towards developing a textile manufacturing sector with the ideal return of creating 10 000 job opportunities. However, the US$2 billion investment only yields 4 000 job opportunities which means that the financial risk did not produce the ideal return (10 000 job opportunities).

[7] For a more detailed discussion on the six determinants of economic diversification, please read: (OECD, 2011) "Economic diversification in Africa: A review of selected countries".

[8] Confucius is a well-renowned Chinese philosopher. The above quote was sourced from Nalla & Sumad (2014).

how fiscal revenue is spent on infrastructure, education and other public goods and services. Good governance refers to a government that: creates a conducive environment for inclusive economic growth, manages the country with integrity, puts the needs of the masses first and is politically stable (Maikke, 2012). For example, the successful implementation of economic diversification strategies in Dubai is mainly attributed to good governance stemming from the leadership of Sheikh Rashid Makhtoum; who had the vision and determination to create a sustainable economy before the depletion of oil occurs (Matly & Dillon, 2007).

There are three branches of government, namely, Executive, Legislature and Judiciary (Mojapelo, 2013). These three branches of government have different duties but their collective objective is to create a prosperous and sustainable economy. Government also encapsulates state controlled institutions, such as public education, health services, civil services and law enforcement. However, the government in most SSA economies have governed badly, which has caused negative spill-over effects on the socio-economic environment (Owoye & Bissessar, 2012). A proxy which this study uses to determine bad governance in SSA is Transparency International's Corruption Perception Index (CPI)[9]. According to Transparency International (2016: 1) "CPI scores and ranks countries/territories based on how corrupt a country's public sector is perceived to be. It is a composite index, a combination of surveys and assessments of corruption, collected by a variety of reputable institutions". The CPI is a popular proxy for measuring corruption. Furthermore, CPI indicates the perceived level of public sector corruption on a scale of 0 (highly corrupt) to 100 (very clean). Most SSA nations rank poorly with index scores closer to 0 from a CPI perspective, which indicates bad governance and weak institutions within the respective three branches of government. The CPI average score of SSA's 20 largest economies in 2015 was 31 out of 100 (2014 average: 30 out of 100)[10].

The government in SSA is categorised into two respective time periods, namely, colonial era and post-colonial era. Governance in the colonial era is characterised as oppressive, unjust, racially biased and greedy (Fanon, 2008). The leaders of the colonial era were Europeans who pillaged and plundered the natural resources of different SSA economies in order to benefit their own domestic economies at the expense of the indigenous population (Rodney, 1973)[11]. The colonists were the political elite who created the inferiority complex by using the three branches of government which they controlled. For example, in South Africa the government implemented apartheid and Bantu Education laws in order to enforce an inferiority complex within the African masses (Rakometsi, 2008). According to Tabata (1979: 35) Bantu Education was "calculated to serve as an instrument for creating and ensuring the continuance of a voteless, rightless and ignorant community whose main purpose of life, apart from

[9] For the CPI scores of the selected SSA economies, please refer to Table 27 in the appendix.
[10] CPI averages are the author's own calculations based on data sourced from Transparency International (2015).
[11] For more insight on the adverse implication of the colonial era, the author of this study recommends the following literature: Rodney (1973) "How Europe underdeveloped Africa", Fanon (2008) "Black Skin, White Mask" and Woodson (1933) "The Mis-Education of the Negro".

reproducing their kind (for there is not yet a specific law against that aspect of their life), is to minister to the whites. The plain fact is that Bantu Education is to rob the African of education, cut him off from the main stream of modern culture and shut him into a spiritual and intellectual ghetto". Furthermore, Gumede (2014) argues that adverse experiences during the period of colonialism, slave trade and imperialism have conditioned the mind of Africans to have an inferiority complex, which is a form of mental slavery. The latter view from Gumede is supported by literature written by Williams (1987), Williams (1945), and Clarke & Harding (1970).

The post-colonial era started when Ghana became the first country in SSA to obtain its political independence in 1957 from British rule (Macbeath, 2010). This is the period which gave birth to the current political elite who have perpetuated poverty and socio-economic underdevelopment in the region. Mbeki (2005) is of the view that there are three drivers that explain why the current political elite have misgoverned their respective countries in SSA. Firstly, the political elite improve their own exclusive living standards to Western levels of opulence, whilst the masses continue to live in squalor. Secondly, the political elite embarked on loss-making industrialisation initiatives, mainly due to a lack of technical and managerial skills. Thirdly, the political elite embezzle public funds by transferring substantial amounts of money to their personal off-shore bank accounts. For example, Sani Abacha (Nigeria) and Mobutu Sese Seko (Zaire) embezzled approximately US$5 billion each during their terms in political office (Hodess, 2004)[12]. According to Diab (2013), it is estimated that US$132 billion was illegally transferred to foreign bank accounts when Hosni Mubarak was the president of Egypt. This massive looted amount in Egypt is eclipsed by the US$150 billion that was embezzled during the past decade in Nigeria under the stewardship of Umaru Masa Yar'Adua and Goodluck Johnathan (Grzelak *et al.*, 2016). "During the past three decades roughly 90 percent of Sub-Saharan Africa's leaders have behaved despotically, governed poorly, eliminated their people's human and civil rights, initiated or exacerbated existing civil conflicts, decelerated per capita economic growth, and proved corrupt" (Rotberg, 2003: 28).

Poor governance in both the colonial era and the current post-colonial era is mainly driven by incentives. Munger (2002) has stated that incentives and disincentives are a superpower which can be used to change a human being's paradigm and behaviour. According to Proctor (2015), paradigms are a multitude of thinking-habits which are passed down from one generation to the next through social conditioning. Paradigms are mental habits which are developed by social constructs, such as religious institutions, schools, close associates and the media (Barker, 1992). Scholars, such as Skinner (1953) and Cialdini (1993) have written literature about the power of incentives and its influence on human behaviour. In a capitalist system, money is arguably the most powerful incentive which drives human

[12] Based on figures from Amadi & Ekewe (2014) research, they have estimated that Sani Abacha and Mobutu Sese Seko looted US$20 million and US$4 billion respectively. For more insight, please refer to Table 31 in the appendix.

behaviour. Garvey (2006), is of the view that financial bribes have been used to incentivise corrupt political leaders of African descent to become traitors, who undermine the development of their own people.

During the colonial era, the former European political elite were incentivised by Africa's lucrative natural resources, which they looted in order to benefit their own national coffers (Grundy, 1966). In addition, the colonists used disincentives, such as fear, death, distrust, envy and torture to keep the oppressed under their control (Lynch, 2009). In the post-colonial era, the political elite, such as Idi Amin, Eduardo dos Santos and Robert Mugabe have used similar disincentive techniques in their respective nations' (Calderisi, 2006). SSA's post-colonial elite are driven by the incentive bias to accumulate riches in a selfish manner, which marginalises and perpetuates poverty of the masses (Amadi & Ekekwe, 2014).

Generally speaking, the aforementioned quote from Confucius is very fitting for most SSA economies who have suffered from poor governance. Inept political leaders' post-colonisation are, to a large extent, the product of the oppressive colonial era environment that they grew up in, before they acquired political power. Hausmann & Rodrik (2003), argue that government must play a constructive role in the economic diversification process by creating a conducive environment that promotes entrepreneurship and investment in non-resource sectors. Moving forward, SSA economies will require a new form of good governance driven by leaders who are incentivised by the need to implement effective economic diversification strategies for long-term inclusive growth and sustainability (Pasmore, 2014).

2.3.2 Macroeconomic fundamentals

The macroeconomic fundamentals are an important determinant of economic diversification (Agu & Caliari, 2014). Macroeconomics is defined as a social science within economics, which studies the holistic performance and behaviour of an economy (Abel *et al.*, 2010). "In each economy there are four main macroeconomic objectives: economic growth, full employment, price stability and balance of payments stability" (South African Reserve Bank, 2016: 1). Rating agencies mainly examine a country's macroeconomic fundamentals when they assign their sovereign credit ratings. There are three major rating agencies which includes: S&P, Moody's and Fitch. Macroeconomic fundamentals are analysed through the use of different economic, external, fiscal and monetary indicators (Bhatia *et al.*, 2016).

SSA's macroeconomic fundamentals are weak because only three countries out of the 20 largest economies in this region have investment grade sovereign credit ratings (Botswana, Namibia, and South Africa). It is advantageous for a country to have investment grade external ratings from an economic

diversification perspective (Strong, 2013; Conradie *et al.*, 2016). Firstly, an investment grade external rating leads to low borrowing costs from financial institutions (Jaramillo & Tejada, 2011). The second advantage of investment grade external ratings is that foreign investors are more willing to invest in business operations and infrastructure projects (*ceteris paribus*).

From an empirical stand point, the overall macroeconomic fundamentals in SSA economies are weak, based on commonly used indicators that are used to measure economic performance. There are various country specific factors which either strengthen or weaken the macroeconomic fundamentals of an economy. In order to get a better understanding of this economic diversification determinant, let's briefly examine some key macroeconomic indicators.

Table 2: Current account balance (% of GDP) of selected SSA countries[13]

Current account balance (% of GDP)											
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	18.20	25.58	17.50	8.55	-10.03	9.10	12.57	12.01	6.68	-2.93	-8.27
Botswana	15.94	18.75	14.97	1.35	-6.37	-2.79	3.03	-1.14	9.35	15.61	7.76
Ghana	-4.50	-5.10	-8.57	-12.42	-6.16	-8.23	-8.95	-11.71	-11.93	-10.01	-7.92
Kenya	-1.28	-1.94	-3.31	-5.43	-4.41	-5.92	-9.10	-8.36	-8.79	-9.77	-6.82
Mozambique	-10.20	-9.09	-8.39	-9.98	-11.03	-16.54	-18.38	-44.48	-38.54	-37.14	-40.44
Nigeria	22.32	16.90	11.02	9.14	5.31	4.02	3.12	4.15	3.95	0.25	-3.12
South Africa	-3.13	-4.45	-5.40	-5.64	-2.67	-1.48	-2.20	-5.10	-5.86	-5.30	-4.33
Tanzania	-6.43	-5.91	-7.96	-9.41	-6.33	-7.11	-13.05	-9.71	-11.31	-10.45	-7.16
Uganda	0.35	-2.52	-3.62	-6.86	-5.60	-8.26	-9.66	-6.75	-7.06	-8.72	-9.30
Zambia	-10.60	-1.69	-4.66	-6.63	1.79	2.38	0.88	1.95	-5.07	-6.93	-9.33

Source: NKC African Economics (2016).

The current account of an economy is the summation of its net trade exports, current transfers and income from abroad. A negative current account balance indicates that a respective economy is a net borrower internationally, while a positive current account balance signifies that the economy is a net lender globally (Mankiw, 2013). In Table 2, it can be observed that Mozambique has consistently incurred current account deficits over the past 11 years. South Africa has also suffered a similar fate as Mozambique in this macroeconomic fundamental.

[13] Please refer to Table 2A in the appendix, for more insight on the current account balance (% of GDP) of the 20 largest SSA economies.

Table 3: Fiscal balance (% of GDP) of selected SSA countries

Fiscal Balance (% of GDP)											
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	9.39	11.81	4.66	-4.45	-7.36	3.45	8.68	4.59	-0.33	-6.57	-4.09
Botswana	10.48	14.50	6.23	-6.77	-12.63	-8.39	-0.19	0.84	6.30	4.09	-5.70
Ghana	-2.87	-4.70	-5.39	-8.44	-7.01	-9.37	-7.33	-11.31	-12.47	-12.37	-7.13
Kenya	-1.37	-2.04	-2.42	-3.38	-4.34	-4.41	-4.12	-5.03	-5.70	-7.40	-8.14
Mozambique	-2.36	-3.47	-2.53	-2.13	-4.88	-3.93	-4.83	-3.77	-2.63	-10.59	-5.90
Nigeria	5.05	8.90	-1.10	5.85	-5.97	-4.23	0.37	0.24	-2.33	-2.08	-3.98
South Africa	-0.28	0.59	0.79	0.05	-5.00	-4.90	-4.03	-4.54	-4.13	-3.68	-3.70
Tanzania	-3.80	-3.51	-3.57	-0.92	-3.37	-4.42	-4.59	-3.21	-3.95	-3.14	-3.15
Uganda	-0.19	-0.71	-0.92	-2.49	-2.05	-5.83	-2.58	-2.99	-4.04	-3.49	-2.99
Zambia	-2.37	16.93	-1.03	-0.66	-2.06	-2.43	-1.77	-2.90	-6.49	-5.99	-8.13

Source: NKC African Economics (2016).

In terms of the fiscal balance, it is defined as the difference between government revenue relative to government spending (Tujula & Wolswijks, 2004). If the fiscal balance has a surplus it indicates that government revenue exceeds government spending, whilst a fiscal deficit occurs when government spending is above the revenue generated by government (Blejer & Cheasty, 1991). From Table 3, it can be observed that Tanzania has incurred fiscal deficits which have averaged 4.4% over the past 11 years. According to Hyde *et al.* (2016), the government of Tanzania admitted that approximately 30% of its fiscal budget, on average, is looted each year by the political elite.

In macroeconomics, a twin deficit refers to a situation when an economy has deficits in both its current account and fiscal budget simultaneously (Cavello, 2005). Deficits in each case must be financed from national reserves or through debt funding in capital markets. It is without question that a deficit in the current account and fiscal balance are macroeconomic fundamental weaknesses. For example, Ghana has incurred twin deficits based on the time series data in Table 2 and 3 respectively. Governments usually borrow funds from local or international sources in order to cover the deficit shortfalls. Twin deficits in terms of the current account balance and fiscal balance tend to increase debt levels. According to Jones & Marshall (2015) there are 17 economies in SSA that are at risk of falling into a debt trap, which would have negative ramifications in terms of financing economic diversification strategies, such as physical infrastructure, agriculture and education. The sustainable prevention of twin deficits in SSA requires prudent fiscal policies, foreign direct investment, competitive real exchange rate and improvement in business conditions for domestic firms (Shimeles *et al.*, 2016).

Table 4: Real GDP (%) of selected regions in Africa[14]

	Real GDP growth (%)				
Country	2007-11	2012	2013	2014	2015
Africa	4.7	6.4	3.9	3.7	3.6
SSA	5.4	4.5	5.2	5.0	3.6
Central Africa	5.9	6.3	3.3	6.1	3.7
East Africa	6.4	4.5	7.2	6.5	6.3
Nothern Africa	3.6	9.6	1.7	1.4	3.5
Southern Africa	3.8	3.4	3.7	2.8	2.2
West Africa	6.3	5.2	5.7	6.0	3.3

Source: African Economic Outlook (2016).

Real GDP is an inflation–adjusted macroeconomic measure that reflects the total value of all goods and services produced within an economy in a given year (Mohr, 2006). This measure is used to determine economic growth. An expansion of economic growth is a prerequisite in terms of improving living standards, job creation and socio-economic development (South African Reserve Bank, 2016). "The growth rate of real GDP is often used as an indicator of the general health of the economy. In broad terms, an increase in real GDP is interpreted as a sign that the economy is doing well" (Callen, 2008: 49). Beckenstein & Lewin (2016), estimate that South Africa will need to attain real GDP growth of at least 7% on an annually basis, in order to induce a meaningful reduction in the country's high unemployment rate.

Real GDP varies across regions on the African continent, which reflects differences in terms of income levels, structural policies, natural resources and political stability. Based on the data in Table 4, economic growth in SSA has averaged a respectable real GDP growth of 4.74% over the 2012-15 period. "Three key factors have underpinned Africa's good economic performance since the turn of the century: high commodity prices, high external financial flows, and improved policies and institutions" (Shimeles *et al.*, 2016: 26). Real GDP growth in SSA decreased from 5% in 2014 to 3.6% in 2015 mainly due to subdued commodity prices. For example, Nigeria's real GDP growth deteriorated from 6% in 2014 to approximately 3% in 2015, primarily as a result of low global crude oil prices and the slowdown in oil production caused by militant vandalism in the oil rich Niger Delta (Onuoha, 2016; Barungi *et al.*, 2016).

[14] For more insight on the real GDP (%) of the 20 largest SSA economies, please refer to Table 4A in the appendix.

Table 5: Inflation (annual %) of selected SSA economies[15]

Inflation (annual %)											
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	22.96	13.30	12.25	12.47	13.73	14.47	13.47	10.29	8.78	7.28	10.28
Botswana	8.62	11.56	7.08	12.70	8.03	6.95	8.46	7.54	5.92	4.42	3.04
Ghana	15.12	10.92	10.73	16.52	19.25	10.71	8.73	9.16	11.61	15.49	17.15
Kenya	10.31	14.44	9.76	26.25	9.23	3.96	14.02	9.38	5.73	6.87	6.59
Mozambique	7.16	13.24	-3.06	14.50	3.79	12.43	11.17	2.60	4.26	2.56	3.55
Nigeria	17.87	8.23	5.38	11.58	11.54	13.71	10.84	12.22	8.47	8.06	9.01
South Africa	3.34	4.65	7.10	10.97	7.16	4.27	4.99	5.66	5.75	6.07	4.58
Tanzania	5.03	7.25	7.03	10.28	12.14	6.20	12.69	16.00	7.87	6.13	5.60
Uganda	8.61	7.22	6.09	12.03	13.01	4.00	18.66	14.03	5.46	4.30	5.32
Zambia	18.33	9.01	10.66	12.45	13.39	8.51	6.43	6.58	6.97	7.81	10.11

Source: NKC African Economics (2016).

Price stability entails that inflation levels in an economy should be low as possible because it has major ramifications on macroeconomic fundamentals and economic diversification. Inflation is a function of various factors, such as oil prices, agricultural output, manufacturing costs and the exchange rate (Hall, 1982). For example, if the inflation rate is 17.15% as was the case in Ghana in 2015, a savings or investment instrument which yields a return 10.87% would be loss making from a real return perspective (Pacific Investment Management Company, 2001). Furthermore, a high inflation rate has an adverse impact on disposable income, thus it has a negative effect in terms of increasing the standard of living and poverty alleviation (Braumann, 2000). Callen *et al.* (2014) argue that a stable, low inflation environment is required in order to promote sustainable economic diversification.

In respect of the South African Reserve Bank, its mandate is to achieve and maintain price stability in the interest of sustainable and balanced economic growth. Price stability in South Africa is based on a 3% to 6% inflation rate target band, which serves as a yardstick. For instance, in 2015 the South African Reserve Bank achieved its price stability mandate because the inflation rate averaged 4.58%.

[15] Table 5A in the appendix, provides additional insight on inflation in respect of the 20 largest SSA economies.

Table 6: Unemployment rate (% of labour force) of selected SSA countries[16]

Unemployment rate (% of labour force)							
Country	2009	2010	2011	2012	2013	2014	2015
Botswana	21.00	21.00	21.00	21.00	21.00	21.00	21.00
Cape Verde	11.10	10.30	10.00	10.00	9.00	9.00	9.00
DRC	60.80	50.10	48.10	48.10	48.10	45.00	45.00
Ghana	11.20	11.20	11.20	11.20	11.20	11.20	11.20
Nigeria	19.70	21.40	23.90	27.40	24.70	26.10	24.00
South Africa	23.70	24.90	24.80	24.90	24.70	25.10	25.50

Source: Bhatia *et al.* (2016).

The unemployment rate refers to the portion of a country's aggregate labour force that is unemployed (Statistics South Africa, 2016). According to Bryne & Strobl (2001: 1) "the unemployment rate is the most widely used indicator of the well-being of a labour market and an important measure of the state of an economy in general". From a macroeconomic fundamental perspective, the unemployment rate can be used to analyse various socio-economic factors which have an impact on economic diversification. For example, a country that has a high unemployment rate indicates that poverty is a major problem which is curtailing sustainable economic growth (Savitz, 2010).

Poverty encapsulates various socio-economic woes, such as undernourishment, low human development, crime and violence. High levels of unemployment adversely impact fiscal policy because there is less tax revenue which could have been used to finance economic diversification determinants, such as improving the socio-economic environment. In addition, Izraeli & Murphy (2003) found empirical evidence of a negative relationship between unemployment and economic diversification.

Nigeria and South Africa are the two largest economies in SSA. However, they have high unemployment rates of 24% and 25.5% respectively in 2015, as depicted in Table 6. The high unemployment rate in Nigeria is a key driver behind an estimated 90.8% of the country's population who live on less than US$2 a day (Jones & Hamilton, 2015). In addition, Bhorat (2007) argues that the possible causes of the high unemployment rate in South Africa include: unfavourable labour regulation, low economic growth, trade unions, inadequate business environment and skill shortages. Poor governance, conflicts and various structural constraints are the main reasons behind the high unemployment rate in the DRC (Ndikumana *et al.*, 2015).

In summary, the macroeconomic fundamentals of SSA need to be improved, more especially the current account and fiscal deficits. Government plays an important role because the Minister of Finance (Fiscal Policy) and Governor of the Reserve Bank (Monetary Policy) are elected into office by the president. Strengthening the macroeconomic environment is not an easy task but it is possible when technocrats

[16] For more insight on the unemployment rate of the 20 largest SSA economies, please refer to Table 6A in the appendix.

are empowered to perform their duties in order to ensure macroeconomic stability, which is an economic diversification determinant.

2.3.3 Socio-economic environment

An environment encapsulates all the mental, spiritual and physical aspects which affect and influence the behaviour of human beings (Hill, 2011). Thus, the socio-economic environment is a major factor which determines our respective paradigms. A paradigm can be simply defined as the way an individual understands, perceives and interprets the surrounding world (Covey, 2004). As stated in the introduction of this study on the determinants of economic diversification; SSA is supposed to a prosperous region that produces high standards of living from a socio-economic point of view given its natural resource abundance. However, in reality the collective paradigm in SSA has conformed to a socio-economic environment that is synonymous with poverty, low human development, violence, infrastructure deficiencies, inadequate social services and underdevelopment (see Amechi, 2009; Corrigan, 2009; Foster & Briceno-Garmendia, 2010).

An appropriate proxy that measures the social environment is the Human Development Index (HDI). According to the United Nations Development Programme (2015: 1), HDI "is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions". In other words, HDI is a composite statistic of education, life expectancy, and income per capita indicators which is used to rank countries into four tiers of human development. Countries are classified into the following four tier categories: (1) very high human development, (2) high human development, (3) medium human development and (4) low human development. For more insight, please refer to Table 7.

Table 7: HDI of selected countries[17]

Country	2014 (HDI score)	2013 (HDI score)	2012 (HDI score)	World ranking (out of 188 countries)
Norway	0.944	0.942	0.942	1
Botswana	0.698	0.696	0.691	106
South Africa	0.666	0.663	0.659	116
Kenya	0.548	0.544	0.539	145
Nigeria	0.514	0.511	0.505	152
Zimbabwe	0.509	0.501	0.491	155
Sudan	0.479	0.477	0.476	167
Mozambique	0.416	0.413	0.408	180

Source: UNDP (2015).

[17] For additional insight on HDI of the 20 largest SSA economies, please refer to Table 7A in the appendix.

It is important to note that HDI is based on a rating scale of 0 (low human development) to 1 (very high human development). From Table 7, it can be observed that Norway with an HDI score of 0.944 in 2014 is ranked 1st out of 188 countries. This evidence bears testament that Norway has used its natural resource wealth in the form of crude oil and gas as a blessing because the Norwegian population have high standards of living. Excluding Botswana, South Africa and Namibia (medium human development), the remainder of the selected SSA countries are classified within the low human development tier category. Therefore, SSA economies must use their financial resources towards effectively investing in education, health care and physical infrastructure as a means to improve the social environment, which is a determinant of economic diversification.

The economic environment is based on supply and demand (Whelan & Msefer, 1996). Consumers demand a product or service, which is supplied by a producer. Thus, the economic environment is the platform where business and trade takes place. For an economy to be able to diversify, it needs to have a conducive environment for entrepreneurs to be able to grow and create job opportunities in the productive sector. A conducive business environment includes the following factors: adequate supply of electricity, property rights, transport infrastructure and access to capital. An appropriate proxy which measures the business environment is the World Bank's ease of doing business (2015), which focuses on regulations that impact small and medium-sized enterprises (SMEs), based on ten business areas. The ten business areas which are converted into a distance to frontier (DTF) index score include: starting a business, provision of electricity, dealing with construction, registering property, access to credit, paying taxes, trading across borders, enforcing contracts, protecting minority investors and resolving insolvency. The DTF index measures the ease of doing business based on a rating scale of 0 (poor business environment) to 100 (good business environment).

Table 8: DTF index of selected countries in 2015[18]

Country	DTF Index (out of 100)	World ranking (out of 189 countries)
Singapore	88.27	1
South Africa	71.08	43
Ghana	65.24	70
Zambia	59.65	111
Mozambique	56.92	127
Mali	52.59	146
Nigeria	47.33	170
Angola	41.85	181

Source: World Bank (2015).

From Table 8, it can be observed that Singapore is the most business-friendly environment in the world based on its DTF index score of 88.27 out of 100. Businesses in SSA on the other hand, are impeded by an economic landscape which curtails growth in the productive sector. A public sector which is

[18] The DTF index of the 20 largest economies in SSA, is available on Table 8A in the appendix.

perceived to be corrupt, which is the case in SSA, has a tendency to create an unconducive business environment for aspiring entrepreneurs and established conglomerates. Thus, a well-managed government in conjunction with the private sector must work together towards improving the various elements which are encapsulated in an effective business environment, such as Singapore, in order to facilitate economic diversification to take place (Lau, 2012).

The socio-economic environment in SSA differs from one economy to another. However, they do share common traits, such as poverty, low human development, violence, poor business environment and infrastructure deficiencies. For respective SSA economies to diversify successfully, a concerted effort is required in order to improve the socio-economic environment. The required improvements will need substantial political will and financial capital. For example, Foster & Briceno-Garmendia, (2010) have stated that adequate infrastructure development which improves the socio-economic environment in Africa will cost approximately US$93 billion per annum. Therefore, in order to achieve economic diversification, the government and other relevant stakeholders must be willing to invest large sums of money effectively towards creating a conducive socio-economic environment.

2.3.4 Natural resources

The SSA region is vastly blessed with an abundance of natural resources. It is endowed with non-renewable mineral commodities and renewable agricultural produce. Collier & Laroche (2015) argue that natural resources can promote inclusive and sustainable growth in SSA if strong institutions are put in place. Furthermore, resource-driven development is the ideal growth opportunity for favourably endowed SSA economies. Natural resources are highly dependent upon by most SSA economies for economic growth, national budget revenue and job creation (Harvey, 2014).

Table 9: Main exports of selected SSA countries

Country	Main exports as a share of total exports (in %)	Number of products accounting for more than 75% of exports
Angola	Crude oil (95.8)	1
Botswana	Diamonds (88.2)	1
Côte d'Ivoire	Cocoa beans (47.8), crude oil (12) and cocoa paste (7.7)	7
DRC	Diamonds (42.6), crude oil (16.7) and non-ferrous ore (17.2)	3
Kenya	Tea (16.8), cut flowers (14.2) and vegetables (8.1)	27
Mali	Cotton (81.8%)	1

Source: African Development Bank (2007).

It can be observed in Table 9 that SSA countries are dependent on natural resources as a means to earn export receipts from total exports. Angola, Botswana and Mali have highly concentrated export baskets because crude oil (95.8%) diamonds (88.2%) and cotton (81.8%) are the main items which generate the most revenue from an export perspective, respectively. Poorly diversified economies are susceptible to

various adverse factors which include: commodity price volatility, mineral depletion and inadequate terms of trade (Shaxson, 2005; Huchet-Bourdon, 2011 and Ahmadov, 2012). The subsequent sections will discuss mineral commodities and agriculture which are encapsulated as natural resources.

2.3.4(a) Mineral commodities

Instead of being an impetus for Africa's renaissance from poverty to prosperity; lucrative mineral commodities in SSA are synonyms with the 'resource curse'. The resource curse is defined as a situation where an economy with vast mineral resources that generates substantial fiscal revenue, paradoxically results to political instability and economic stagnation (Overseas Development Institute, 2006; Sachs & Warner, 1995). In addition, Brown (2009) is of the view that a resource curse is the tendency in which most natural resource rich economies are less developed and produce low inclusive economic growth relative to resource scarce economies. For example, it has been proven empirically that Zimbabwe, which has a vast amount of mineral commodities is suffering from the resource curse (Mahonye & Mandishara, 2015).

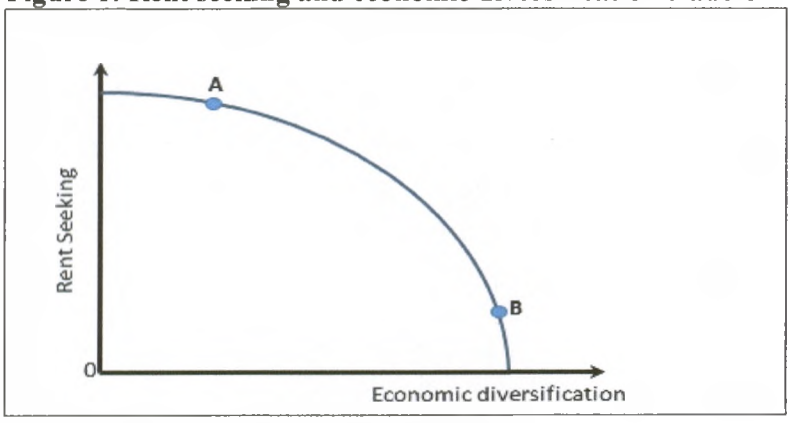
Auty & Gelb (2000) argue that the resource curse results in investment inefficiency and economic distortions, which curtails economic diversification efforts into other non-resource sectors. It is important to note that the resource curse is unpinned by four key explanations behind its occurrence in mineral-dependent economies (Sturm *et al.*, 2009). Firstly, revenue from mineral commodities tends to be a source of corruption, political instability, high income inequalities, ethnic enmity, conflict and the perpetuation of poverty (Easterly & Levine, 1997; Brunnschweiler & Bulte, 2008). Furthermore, Fearon & Laitin (2003) are of the view that mineral commodities tend to be the underlying cause behind civil war.

The second explanation behind the resource curse is the Dutch disease. According to Demissie (2014: 16) "Dutch disease refers to a reduction in a country's ability to export from non-resource sectors as a result of an appreciation in the exchange rate due to substantial earnings from the export of natural resources". For example, during a boom cycle an oil-dependent economy would gain higher foreign exchange receipts; causing an appreciation of the local currency which results in the non-resource sector exports (e.g. leather shoes) becoming less competitive from a pricing point of view. Intuitively, the Dutch disease is a constraint to economic diversification strategies that are implemented with the objective of establishing robust non-resource sectors for long-term growth (Bornhorst *et al.*, 2009). Various scholars have demonstrated in their respective studies the existence of the Dutch disease in underdeveloped mineral-dependent economies, including SSA (Bariber 2003; Auty 1993; Gylfason 2001).

Corrupt individuals who partake in rent seeking activities is the third explanation behind the resource curse (Auty, 2001). Rent seeking is defined by Karl (2007: 661) as a situation where "efforts, both

legal and illegal, to acquire access to or control over opportunities for earning rents". Corruption entails the abuse of power in order to gain an incentive, which in most cases is monetary in nature (Kaufmann & Vicente, 2011). Please refer to Figure 1 for a graphical illustration of the adverse impact of corrupt rent seeking behaviour on economic diversification.

Figure 1: Rent seeking and economic diversification trade-off



Source: International Monetary Fund (2016).

From Figure 1, it can be observed that under the assumption of *ceteris paribus*, that there is a trade-off between rent seeking and economic diversification. Point A on Figure 1 depicts a country which has poor governance that has manifested into high levels of rent seeking at the expense of economic diversification. On the other hand, Point B indicates a country which has used its natural resources effectively in terms of financing and implementing economic diversification strategies. Lane & Tornell (1999) argue that resource abundance incentivises rent seeking behaviour in mineral rich economies. Thus, SSA economies, such as Nigeria and Angola which have high levels of corruption based on Transparency International's CPI rankings, must reduce the rent seeking behaviour of their respective political elite in order to achieving economic diversification. A legitimate way of reducing rent seeking is to create an organisational culture within the respective SSA countries, which promotes good governance.

Lastly, the volatility of primary natural resource commodities is also a key explanation behind the resource curse. Ommes & Kalcheva (2007) argue that resource rents tend to be volatile partly due to low price elasticity of supply. For example, volatility of global crude oil prices is one of the main reasons why Nigeria's real GDP growth deteriorated from 6% in 2014 to an estimated 3% in 2015 (Burungi *et al.*, 2016). It is important to note that the price of primary commodities, such as gold (mineral commodity) and cotton (agricultural produce) are determined by global markets relative to manufactured goods. In other words, when a given economy is dependent on exporting primary commodities to generate revenue, it is a price taker while a manufacturing-based economy is a price maker. For example, Kenya exports its unprocessed cotton in terms of a given international price but China manufactures clothing from cotton has the autonomy to determine the price of its goods.

Furthermore, Brown *et al.* (2008) argue that volatility from natural resource commodities has an adverse impact on national budget planning and it leads to significant job losses during bust cycles.

In summary of this section on natural resources as a determinant of economic diversification, it is imperative to emphasise that the resource curse can be converted into a blessing. The conversion process for SSA economies that are suffering from the resource curse is to reduce rent seeking behaviour in favour of implementing effective economic diversification strategies in other productive non-resource sectors. Secondly, SSA economies that are endowed with natural resources, such as gold and cotton must consider value-add manufacturing initiatives so that they can become a price maker instead of a price taker. In terms of mitigating external shocks in the form of droughts, SSA economies must invest in modernised irrigation systems and implement productive farming techniques. There is empirical evidence of economies that have used their natural resource as a blessing which include: Norway, Dubai, Malaysia and Canada (Rosser, 2004; Collier & Laroche, 2015; Kahwaji, 2007). When SSA economies manage their natural resource wealth properly, it can be used to finance economic diversification strategies which produce sustainable long-term growth.

2.3.4(b) Agriculture

Agriculture is an important sector for the well-being and performance of an economy (Kleemann, 2012). The first rationale for agriculture's importance is that this sector produces food and material for manufacturing clothing, which are essential physiological needs for human survival. Without food, a human being is less productive and will eventually die from starvation due to a lack of sustenance. Secondly, lucrative cash crops generate revenue which can be used to finance economic diversification strategies and infrastructure development.

SSA has a comparative advantage in agriculture because of its vast arable land, conducive climate and large water resources (Chingarande *et al.*, 2013; Ricardo, 1817). In addition, approximately 60% of the world's uncultivated land is located within this region which can be used to supply the global food demand, which is expected to increase by 35% in 2030 (Fauconnier *et al.*, 2016). However, this region is synonymous with people who are undernourished and dying from malnutrition. Undernourishment means that an individual is unable to acquire enough food to meet the daily minimum dietary requirements, over a period of one year (Food and Agriculture Organisation of the United Nations, 2015). Studies have proven that malnutrition leads to reduced physical and mental development (Bain *et al.*, 2013). According to the United Nations (2004: 6) "malnutrition erodes human capital, reduces resilience to shocks and reduces productivity (through effects on physical and mental capacity). Early child malnutrition is partially irreversible and intergenerational, with consequences for adult health, including an increased risk of chronic disease".

Table 10: Prevalence of undernourishment

	Number of undernourished (millions) and prevalence (%) of undernourishment									
	1990–92		2000–02		2005–07		2010–12		2014–16*	
	No.	%	No.	%	No.	%	No.	%	No.	%
WORLD	**1 010.6**	**18.6**	**929.6**	**14.9**	**942.3**	**14.3**	**820.7**	**11.8**	**794.6**	**10.9**
DEVELOPED REGIONS	**20.0**	**<5.0**	**21.2**	**<5.0**	**15.4**	**<5.0**	**15.7**	**<5.0**	**14.7**	**<5.0**
DEVELOPING REGIONS	**990.7**	**23.3**	**908.4**	**18.2**	**926.9**	**17.3**	**805.0**	**14.1**	**779.9**	**12.9**
Africa	**181.7**	**27.6**	**210.2**	**25.4**	**213.0**	**22.7**	**218.5**	**20.7**	**232.5**	**20.0**
Northern Africa	6.0	<5.0	6.6	<5.0	7.0	<5.0	5.1	<5.0	4.3	<5.0
Sub-Saharan Africa	175.7	33.2	203.6	30.0	206.0	26.5	205.7	24.1	220.0	23.2
Eastern Africa	103.9	47.2	121.6	43.1	122.5	37.8	118.7	33.7	124.2	31.5
Middle Africa	24.2	33.5	42.4	44.2	47.7	43.0	53.0	41.5	58.9	41.3
Southern Africa	3.1	7.2	3.7	7.1	3.5	6.2	3.6	6.1	3.2	5.2
Western Africa	44.6	24.2	35.9	15.0	32.3	11.8	30.4	9.7	33.7	9.6

Source: Food and Agriculture Organisation of the United Nations (2015).

In Table 10, it can be observed that SSA has the highest prevalence of undernourishment relative to developed and developing regions. All things being equal, individual X who is malnourished due to lack of sustenance is less productive than well-fed individual Y. From a macroeconomic view point, it is evident that a country such as Ethiopia, which has high levels of malnutrition, is less competitive than Switzerland based on the World Economic Forum's Global Competitiveness Index (Schwab *et al.*, 2015)[19]. It is interesting to note that the number of undernourished people in the world has decreased from 1 billion in 1990-92 to approximately 795 million people in 2014-16. However, in SSA the number of undernourished people has increased from 176 million in 1990-92 to 220 million in 2014-16.

The Cobb-Douglas production function will be discussed in order to emphasise the importance of agriculture as a determinant of economic diversification. The standard Cobb-Douglas production function is illustrated as follows:

$$Y = AK^{\alpha}L^{1-\alpha} \quad \ldots\ldots (1)$$

where, Y denotes total production of output; K is capital input; L is labour input; A is total factor productivity and α is the output elasticity of capital, constant between 0 and 1 ($0 < \alpha < 1$).

There are three main assumptions of the Cobb-Douglas production function. Firstly, if either capital or labour decreases (*ceteris paribus*), it will have an adverse impact on total production of output. Secondly, the marginal productivity of labour is proportional to production per unit of labour. Thirdly, production per unit of capital is proportional to marginal productivity of capital (Tan, 2008). In addition, the Cobb-Douglas function exhibits constant returns to scale (Border, 2004; Solow, 1956). According to Jung (2014) a production function has constant returns to scale if changing all input factors by a

[19] The Global Competitiveness Index (GCI) information of the 20 largest SSA economies and the top eight most competitive economies in the world, is available in the appendix (Table 29 and Table 30).

positive proportion results in the same proportional change in total production of output. For more insight on this production function, please refer to Cobb & Douglas (1928).

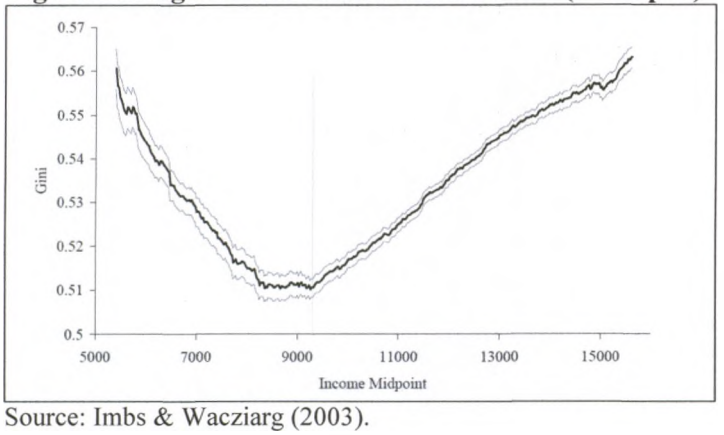
Before moving on to the next section, a brief discussion of the importance of agriculture as a determinant of economic diversification based on equation 1 follows. In order for labour productivity to increase, sufficient food is needed. Without the required nutrients and sustenance sourced from agricultural produce; the human mind and body will be unproductive from a labour input standpoint. SSA economies must invest in food production so that labour can contribute positively towards increasing total production of output. The agricultural sector is a solid revenue source which can be used to finance capital inputs, such as infrastructure, machinery and technology. Furthermore, agriculture provides opportunities for respective SSA economies to diversify into agro-processing and clothing manufacturing (see Balchin *et al.*, 2016; Schaffnit-Chatterjee, 2014; Louw *et al.*, 2008).

2.4 Empirical evidence literature on economic diversification

Various studies have analysed the importance of economic diversification from a quantitative point of view. From example, Esanov (2012) used a panel regression model in order to identify the main determinants of economic diversification. One of the key findings of this study was that the quality of government and physical infrastructure are the main variables which determine whether economic diversification strategies fail or succeed. In a study conducted by Owoye & Bissessar (2012), they were able to prove empirically that inept leadership and institutional failure in Africa manifests into bad governance and corruption which undermine socio-economic development. Shediac *et al.* (2008) were able to substantiate their argument by using quantitative data analysis, that effective economic diversification is an essential component of a sustainable economy.

In a seminal study, Imbs & Wacziarg (2003) demonstrated empirically that there is a U-shaped relationship between economic diversification and per capita income. Please refer to Figure 2 below for a graphical illustration of the U-shaped relationship between both variables of interest:

Figure 2: Stages of economic diversification (U-shaped)



Source: Imbs & Wacziarg (2003).

The y-axis in Figure 2 is the Gini Index which is one of the measures used to determine the extent of economic diversification. A country that has Gini Index closer to 0 indicates a well-diversified economic structure, whilst a index score closer to 1 depicts poor diversfication. The above figure indicates that the economic diversification development path occurs over two respective stages. In the first stage, a given economy (e.g. Dubai) begins its development path from being highly dependent on unsustainable oil reserves to a sustainable economy that has productive manufacturing and services sectors. As economic diversification strategies are effectively implemented and start producing the required results over a period of time, the Gini Index decreases whilst income per capita income increases. At a per capita income level of approximately US$9 200, the second stage of the diversification process starts to take place. At the second stage of diversification, there is a now a positive relationship between per capita income and the Gini Index because the economy has made the transition from being a unsustainable primary-based economy to a sustainable knowledge-based economy (Mustapha & Abdullah, 2004; De Farranti *et al.*, 2002; OECD, 1996). Empirical evidence which underpins the U-shaped non-monotonic relationship between economic growth and economic diversification in Figure 2, is supported by findings from a emprical studies conducted by Kaulich (2012) and Kalemli-Ozcan *et al.* (2003), respectively. However, it is important to note that there are other empirical studies which argue that there is a postive monotonic relationship between economic growth and economic diversification (Al-Marhubi, 2000; Herzer and Nowak-Lehman, 2006).

A study which used a panel dataset of 42 SSA's countries showed that export basket diversification has a positive impact on economic growth (Hodey *et al.*, 2015). From a Nigerian perspective, Ayeni (2013) has proven statistically that this country will benefit from diversifying its oil-based economy by promoting the tourism sector, which can become a sustainable economic growth engine. Elhiraika & Mbate (2014) analysed data of 53 African countries in order to study the relationship between economic diversification and economic growth. One of the main findings was that per capita income, public investment and human capital development are statistically significant in respect of economic diversification. For more insight on other empirical studies, please refer to Table 11.

Table 11: Overview of empirical studies related to economic diversification

Brief Description of Empirical Studies	Region	Estimation method	Major statistically significant variables	Main findings
Agosin *et al.*, 2016	Global	Panel OLS, Fixed Effects and GMM	**Dependent variable**: Export concentration index, **independent variables**: trade openness, real exchange rate, human capital accumulation, GDP per capita and terms of trade.	Human capital accumulation as a determinant of diversification, contributes positively in terms of expanding a country's export basket.

Haous & Heshmati, 2014	UAE	OLS regression model	**Dependent variable:** Normalized-Hirschman Index, **independent variables:** gross fixed capital formation, GDP per capita, trade openness, inflation and investment rate.	The domestic financial system should be broadened in order to achieve sustainable growth and economic diversification.
Esanov, 2012	Global	Time series panel data using random effects generalised least squares method	**Dependent variable:** Herfindahl-Hirschman Index, **independent variable:** investment freedom, FDI, GDP per capita, government effectiveness, access to water, trade freedom index, and resources as a percentage of exports.	Government quality as well as infrastructure have a significant impact on the extent of economic diversification.
Shediac *et al.*, 2008	GCC, G7 and developing economies	Descriptive and quantitative analysis	**Dependent variables:** Concentration ratio and diversification quotient, **independent variables:** real GDP growth, employment, labour productivity growth volatility.	Economic diversification is an essential component of a sustainable economy. In addition, volatility stemming from natural resources can be mitigated through effective diversification and development of valued added exports.
Owoye & Bissessar, 2012	Africa	Panel OLS regression model	**Dependent variable:** Corruption index, **independent variables:** real GDP per capita, number of successful coup d'états, rule of law, voice and accountability.	High levels of corruption and bad governance in African countries are effects which are caused by poor leadership and institutional failure.
Savitz, 2010	USA	Multiple linear regression model	**Dependent variable:** Unemployment rate, **independent variables:** Herfindahl index, and percentage change in GDP.	There is a statistically significant negative relationship between the unemployment rate and economic diversification.
Mahonye & Mandishara, 2015	Zimbabwe	OLS regression model	**Dependent variable:** Real GDP per capita, **independent variables:** primary exports as a percentage of GDP, real mining growth, real agriculture growth, real manufacturing growth, secondary school enrolment, FDI, political rights index	The empirical results of this study show that political rights, property rights and real manufacturing growth are important determinants of economic growth. Furthermore, Zimbabwe is suffering from the resource curse.

			and property rights index.	
Olaleye *et al.*, 2013	Nigeria	Granger Casualty Test based on 30 years of time series data	**Dependent variable:** Per capita income, **independent variables:** oil export share of total exports, manufactured products share of total exports, agriculture products share of total export.	This study's regression results showed that there is a statistically significant long-term relationship between per capita income and the respective independent variables.
Fielding, 2000	95 countries of which 24 are located in SSA	Cross-country structural model	**Dependent variable:** Per capita income **independent variables:** life expectancy, literacy rates, Gini Index.	There is a correlation between the reduction in inequality and improvements in life expectancy, per capita income and literacy.
Anyaehie & Areji, 2015	Nigeria	Descriptive analysis	**Dependent variable:** Diversification index **independent variables:** agriculture, manufacturing, oil and non-oil exports.	Economic diversification in Nigeria has not occurred mainly due to the following constraints: macroeconomic orientation, weak governance institutions, corruption, inadequate infrastructure, mismanagement of resources and inadequate educational system.
Asche *et al.*, 2012	Africa	Descriptive analysis	**Dependent variable:** Export diversification index **independent variables:** Competitive Industrial Performance Index, GDP per capita	Economic diversification strategies are important drivers in Africa's industrial development.
Bertocchi & Guerzoni, 2010	SSA	Pooled OLS, Random effects and 2SLS	**Dependent variable:** CPIA, **independent variables:** civil liberty index, revolutions, GDP, life expectancy, inflation, ethnic fractionalisation.	State fragility in SSA refers to the inability to provide basic services. In addition, poor governance quality within SSA perpetuates abject poverty.
Mubeen & Ahmad, 2016	Pakistan	Auto Regressive Distributive Lag(ARDL) approach	**Dependent variable:** Gini Hirschman Index, **independent variables:** FDI, geographic concentration of exports, trade openness, real effective exchange rate, GDP per capita.	The findings of this study show that FDI and real effective exchange rate can play a significant role towards attaining economic diversification.

2.5 Conclusion

The political elite of SSA economies must break the chains of the inferiority complex within themselves, which were established during the colonial period. Poor CPI scores from Transparency International, which is a proxy that measures corruption, indicates the high levels of inferiority complex and mismanagement within government structures in most public institutions in SSA.

By liberating themselves mentally from inferiority complex paradigms; the current political elite in the respective SSA economies will be enabled to be reputable leaders who can provide good governance, which is a foundational determinant of economic diversification. Reputable leaders that are needed in SSA must have the habits of highly effective individuals and a firm understanding of the principles of prosperity (Covey, 2004; Allen, 1911). According to Mandela (2002: 1)[20] "There is still too much suffering on our continent that could have been prevented by leadership which put the interest of the people supreme". Unfortunately, SSA's political elite both in the colonial and post-colonial periods respectively have enriched themselves at the expense of the masses who continue to live in squalor.

Without good governance; economic diversification plans are bound to fail. However, when good governance is provided it creates an environment conducive for other determinants of economic diversification to operate effectively. Other important determinants of economic diversification include: macroeconomic stability, agriculture, efficient investments in physical infrastructure, inclusive real GDP growth, education, savings, and intra-Africa trade amongst others. Economic diversification is a long-term strategy which encompasses various elements which either propels or constrain its manifestation.

There is vast empirical literature on economic diversification and its determinants. However, the general consensus is that economic diversification is an essential component of a sustainable economy (Shediac *et al.*, 2008). Economic diversification is a function of various economic and non-economic variables. Out of all the various determinants of economic diversification, government quality is considered to be the most important. Therefore, the conceptual and theoretical framework will be used as a foundation towards developing a panel regression methodology in order to test the statistical relationship between economic diversification and government quality. The next chapter of this study will discuss the extent of economic diversification in SSA.

[20] Nelson Mandela articulated these words when he received the Order of the Lion of Malawi from President Bakili Muluzi (22 May 2002).

CHAPTER THREE: EXTENT OF ECONOMIC DIVERSIFICATION IN SSA

3.1 Introduction

The purpose of this chapter is to discuss the extent of economic diversification in SSA. Generally speaking, economic diversification "refers to exports, and specifically to policies aiming to reduce the dependence on a limited number of export commodities that may be subject to price and volume fluctuations or secular declines" (Routledge Encyclopaedia, 2001: 360). There are two main types of economic diversification that can take place: vertical diversification and horizontal diversification. Grant (2004) argues that vertical diversification encourages backward and forward linkages in a respective economy because it entails value-add processing from primary to secondary and tertiary sectors. Horizontal diversification on the other hand refers to a situation where new opportunities are pursued within the same industry (Hvidt, 2013).

A numerical measure is needed in order to quantify the extent of economic diversification which will be the departure point for further analysis. Thus, the selected measures of economic diversification and its application through graphical trend analysis, will be discussed below.

3.2 Different measures of economic diversification

There are various measurement methods that can be used to determine the extent of economic diversification. For example, the entropy method measures economic diversification against a uniform distribution of employment where the benchmark has an equally proportional distribution of employment across all industrial sectors (Hackbert & Andersen, 1975). However, Wasylenko & Erickson (1978) argue that the entropy method is an inadequate measure for examining economic diversification among regions over a given time period. Other measures that have been used to determine the extent of economic diversification include: Ogive Index, Simpson Index, Gini Index, Normalised-Hirschman Index, and the Herfindal Index (Joshi *et al.*, 2004; Al-Marhubi, 2000; Clarke & Sawyer, 2014).

In terms of this study, two measures sourced from the United Nations Conference on Trade and Development (UNCTAD) will be used to quantify the extent of economic diversification. Firstly, the UNCTAD diversification index indicates whether the structure of exports or imports of a respective country differs from the world pattern. The following formula is used to calculate the UNCTAD diversification index:

$$S_j = \frac{\sum_i |h_{ij} - h_i|}{2} \quad \text{..... (2)}$$

where, S_j is the UNCTAD diversification index; h_{ij} is the share of product *i* in total exports or imports; and h_j is the share of product *i* in total world exports or imports.

The UNCTAD diversification index has a measurement scale of 0 to 1 (a value closer to 0 indicates a more diversified economy and a value closer to 1 depicts a less diversified economy). For more insight please refer to the table below:

Table 12: UNCTAD diversification index averages of selected SSA countries

Country	Average index score (1995-1999)	Average index (2000-2005)	Average index (2006-2010)	Average index (2011-2015)
Nigeria	0.8885	0.8685	0.8327	0.8110
South Africa	0.5177	0.5534	0.5695	0.5352
Angola	0.8651	0.8414	0.8323	0.8445
Sudan	0.8006	0.8208	0.8249	0.8160
Kenya	0.7198	0.7311	0.6769	0.6421
Botswana	0.8806	0.8978	0.8593	0.9013

Source: UNCTAD (2015). Please note: the respective average index scores are the author's own calculations.

It can be observed in Table 12 that South Africa (average index of 0.54), is the most diversified economy relative to the other SSA countries. Masetti & Lanzeni (2014) argue that countries that have inadequate levels of economic diversification, such as Nigeria, must improve physical infrastructure, the business environment, government institutions and financial markets in order to stimulate economic diversification.

Secondly, the UNCTAD concentration index provides quantitative data on how exports of a given country are either concentrated on a few products or distributed more heterogeneously among a series of products. UNCTAD's concentration index formula is depicted below:

$$H_j = \frac{\sqrt{\sum_{i=1}^{n} \left(\frac{X_{ij}}{X_j}\right)^2} - \sqrt{1/n}}{1 - \sqrt{1/n}} \quad \text{..... (3)}$$

where, H_j is UNCTAD concentration index; X_{ij} is the value of export for country *j* and product *i* and n is the number of products.

UNCTAD's concentration index also has a measurement scale of 0 to 1. An index value closer to 0 indicates that a country's exports are more diversified among a series of products. On the contrary, an UNCTAD concentration index value closer to 1 depicts a country's exports are highly concentrated on a few products.

Table 13: UNCTAD concentration index averages of selected SSA countries

Country	Average index score (1995-1999)	Average index (2000-2005)	Average index (2006-2010)	Average index (2011-2015)
Nigeria	0.8831	0.8827	0.8355	0.7656
South Africa	0.1139	0.1326	0.1491	0.1329
Angola	0.8753	0.9183	0.9532	0.9517
Sudan	0.3041	0.5040	0.7073	0.6386
Kenya	0.2388	0.2356	0.1980	0.2024
Botswana	0.7091	0.7394	0.5848	0.7924

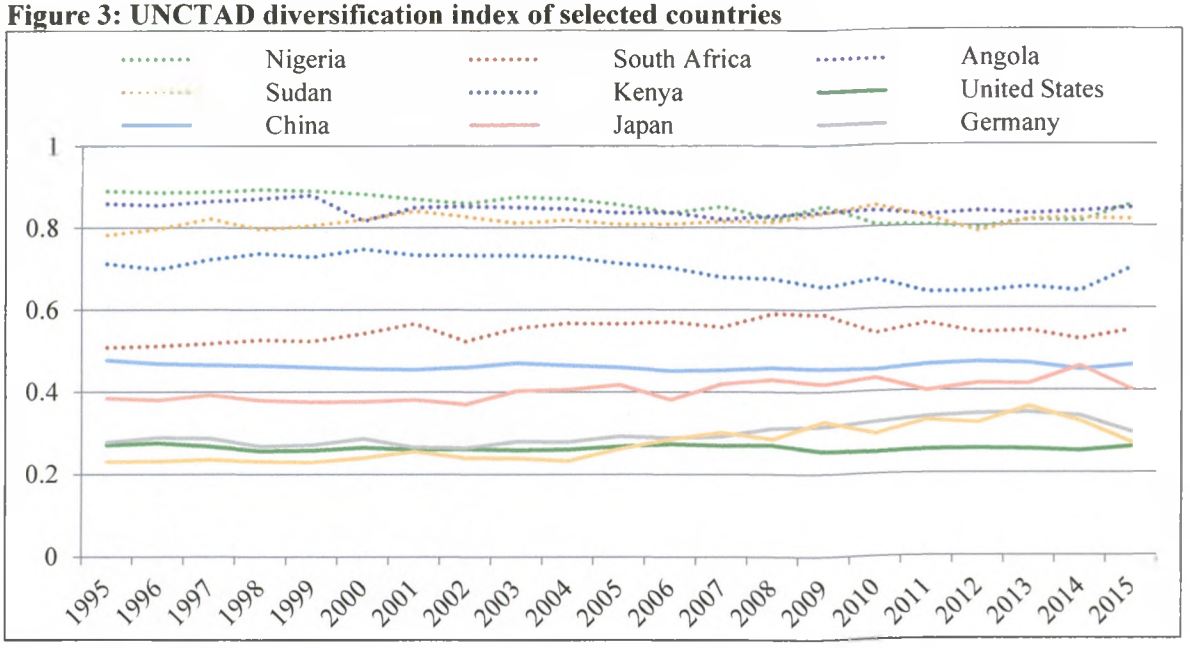
Source: UNCTAD (2015). Please note: the respective average index scores are the author's own calculations.

In Table 13, the UNCTAD concentration index reveals that South Africa (0.13) and Kenya (0.20) have a more diversified export basket relative to Angola (0.95). According to OPEC (2016), Angola's oil sector contributes approximately 95% of total exports and 45% of the country's GDP. In terms of Sudan, its UNCTAD concentration index average deteriorated from 0.30 to 0.64 because the first oil pipeline in the country started operating in 1999 (Siddig, 2012).

3.3 Economic diversification trend analysis

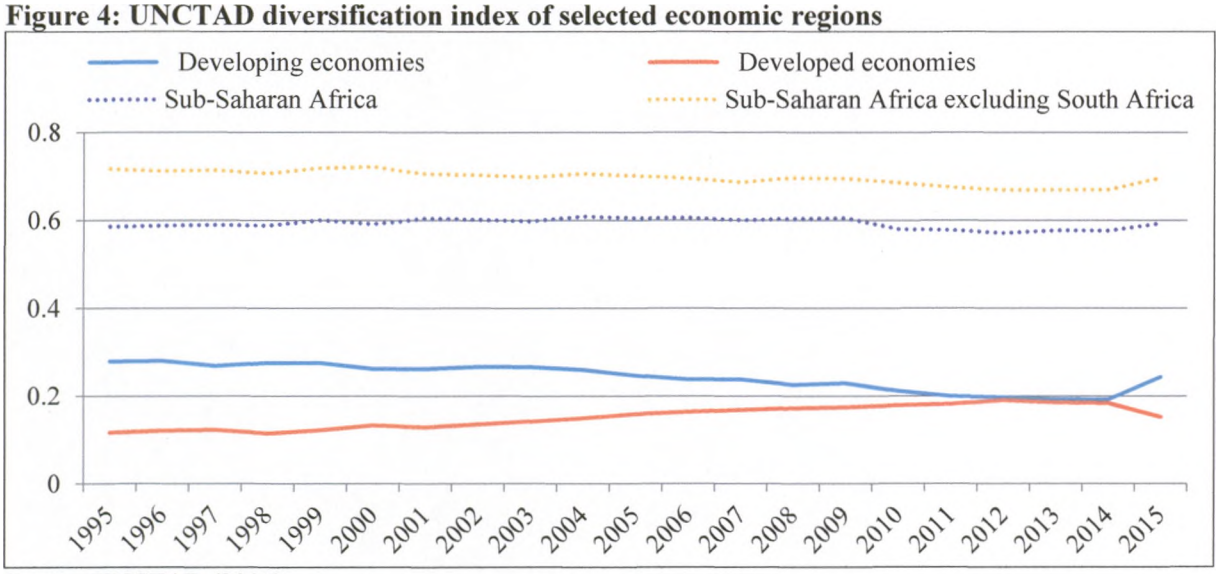
Before the regression model methodology of this study is discussed in the next chapter, it would be useful to conduct a brief trend analysis on the UNCTAD diversification and concentration indices respectively.

Figure 3: UNCTAD diversification index of selected countries



Source: UNCTAD (2015).

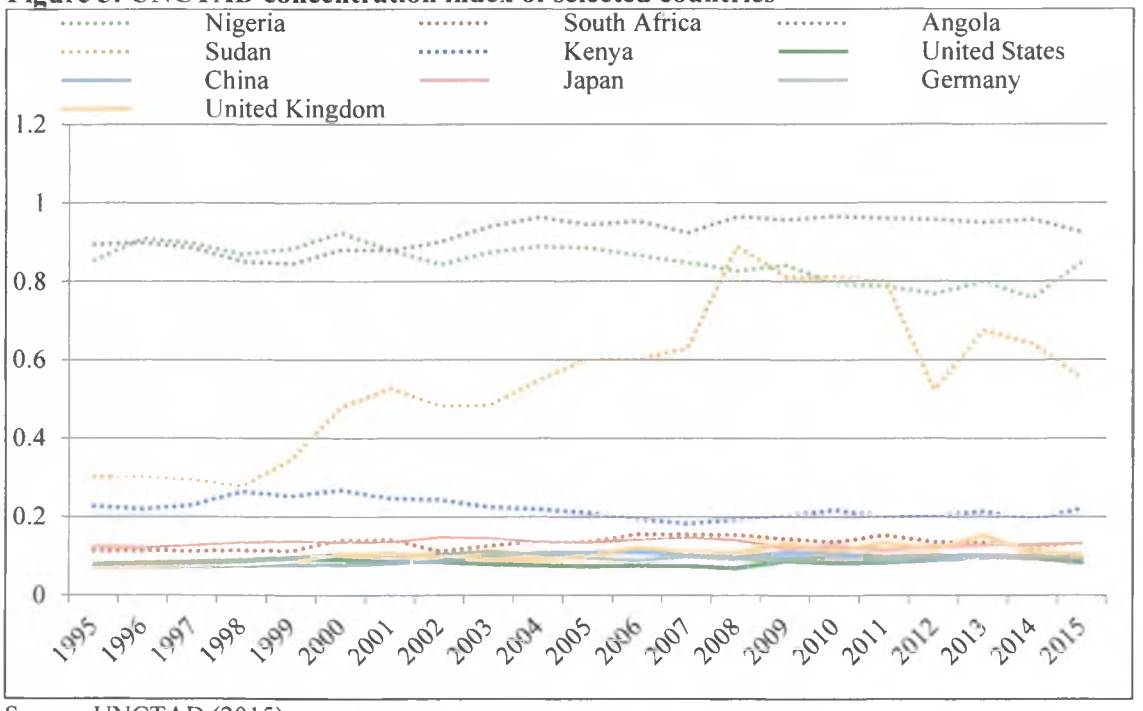
Figure 4: UNCTAD diversification index of selected economic regions



Source: UNCTAD (2015).

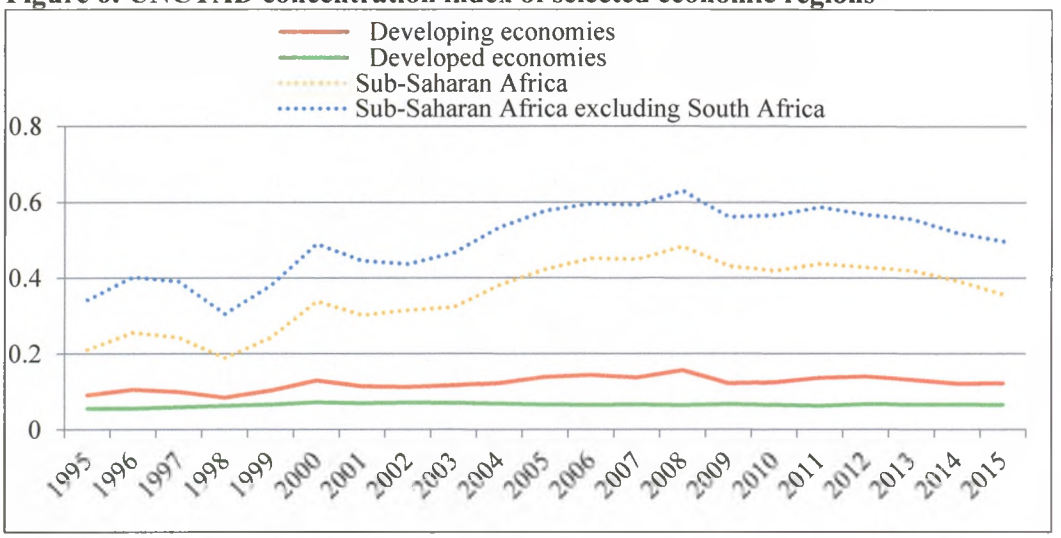
Looking at Figures 3 and 4 on the UNCTAD diversification index, it can be observed that SSA economies do not compare favourable relative to developed economies. The situation is more dire when South Africa is excluded from the SSA diversification index dataset. Angola, Nigeria and Sudan are the least diversified economies in terms of the selected countries in Figure 3. An important trend is that developed economies, such as the United States and Germany, are well-diversified. Thus, SSA economies in their pursuit of sustainable socio-economic development must focus on achieving economic diversification.

Figure 5: UNCTAD concentration index of selected countries



Source: UNCTAD (2015).

Figure 6: UNCTAD concentration index of selected economic regions



Source: UNCTAD (2015).

In terms of the UNCTAD concentration index, it can be observed in Figures 5 and 6 respectively, that SSA economies have highly concentrated export baskets relative to developed economies. In other words, SSA is dependent on a few products in its export basket; meaning its economies, such as Angola are more vulnerable to external shocks (e.g. sharp decline in global crude oil prices). "For Africa, with its high dependence on primary commodities and fluctuating world prices on most primary goods, there is therefore a need for Africa to pursue development strategies which promote export diversification" (Spence *et al.*, 2012: 5).

3.4. Brief background of economic diversification in SSA

Since the 1960's, SSA economies' post-colonisation have created various national development plans (NDP) in order to achieve socio-economic development and economic diversification objectives to ensure long-term sustainability. NDP is the first point of reference which outlines a respective country's long-term socio-economic vision and development strategy (Zarenda, 2013). However, the United Nations Economic Commission for Africa (2014) is of the view that SSA countries have failed to achieve their respective NDP objectives mainly due to the following aspects: institutional weaknesses, political factors, external shocks and net job losses as a result of Structural Adjustment Programmes (SAPs).

SAPs were introduced in Africa as a mechanism to resolve Africa's economic crisis in the 1970's by the World Bank and the International Monetary Fund. The objective of SAPs was to promote economic development in SSA (Berg *et al.*, 1981). The main classical/neoliberal features of SAPs are listed in Table 14.

Table 14: The main features of SAPs

1. Macroeconomic stabilisation policies which are anti-inflationary.
2. Prudent fiscal management.
3. Eliminate government support in terms of social services and subsidies.
4. Control foreign indebtedness.
5. Disbanding government parastatals through privatisation.
6. Currency devaluation and trade liberation in order to improve current account balance.
7. Free market and private sector development.

Source: Hedihues & Obare (2011).

However, SAPs have failed to achieve the objective of accelerating socio-economic development within the SSA region (see: Mkandawire & Soludo, 1999; Lipumba, 1994). For example, Stein (1994) argues that SAPS as a developmental strategy was ill-equipped to promote development in Africa due to its neoclassical foundation. In addition, "SAPs imposed serious socio-economic problems on the continent" (Lopes, 2013:1).

It is important to note that even before ineffective SAP developmental plans were implemented (1980-1999), there were countries in SSA that had economic diversification strategies. For example, Botswana's pursuit of implementing effective economic diversification strategies can be traced back to the Industrial Development Act of 1968 (Sekwati, 2010). Referring to Table 12 and 13, it can be observed that Botswana has not reduced its dependence on diamond production (UNCTAD, 2015; Stephens, 2016). According to the African Development Bank (2016), mineral revenue mainly in the form of diamonds contributes approximately 33% of Botswana's total government revenue. In August 2005, the former president of Botswana (Mr. Festus Mogoe), established the Business and Economic Advisory Council (BEAC) as an advisory body to assist the country to achieve its main objective of accelerating economic diversification in order to reduce diamond production as the main source of government revenue. The BEAC conducted in-depth case studies on countries that have done well in terms of formulating and implementing economic diversification strategies (e.g. Malaysia, Dubai, Costa Rica, Singapore and Mauritius). According to the Government Implementation Coordination Office (2008)[21] one of the key BEAC findings was that economies, such as Dubai and Singapore, created an overall business climate which was attractive to private and foreign investment.

Recently, other SSA economies have been implementing economic diversification strategies as a means to overcome external shocks and achieve sustainable socio-economic development. For example, Angola has put in place a Sovereign Wealth Fund (SWF) which has an initial endowment worth US$5 billion (Fundo Soberano de Angola, 2016). The chairman of Angola's SWF is José Filomeno de Sousa

[21] Please refer to Government Implementation Coordination Office (2008), for more detail on Botswana's economic diversification strategy.

dos Santos, he is the son of President Eduardo dos Santos[22]. According to Hove (2016) the following SSA economies have SWFs: Ghana, Senegal, Kenya and Tanzania. Furthermore, Nigeria is also pushing towards attaining economic diversification as a means to overcome oil price volatility (see Kale, 2016; Suberu *et al.*, 2015).

3.5. Conclusion

The above trend analysis section briefly examined the extent of economic diversification of selected economies from a UNCTAD diversification index and UNCTAD concentration index respectively. One of the key observations from the economic diversification trend analysis was that developed economies are well-diversified relative to natural resource dependent economies in SSA.

Moving forward, SSA economies must create a conducive environment for economic diversification to take root in their respective countries. A conducive economic diversification environment includes: good governance, physical infrastructure, human development and financial capital. The next chapter of this study will outline the panel regression methodology, based on selected determinants of economic diversification.

[22] For more insight on the corrupt political leadership of President Eduardo dos Santos in Angola, please refer to: Hodge (2004) and Le Billon (1999).

CHAPTER FOUR: METHODOLOGY OF THE DETERMINANTS OF ECONOMIC DIVERSIFICATION

4.1 Introduction

The conceptual and theoretical framework has provided the foundation which this study will build on, in terms of developing a panel regression model methodology. The main purpose of this chapter is to outline the regression model which will be used to analyse the 20 largest SSA economies from a GDP point of view, based on variables which are considered to be determinants of economic diversification.

There are empirical studies which have analysed various determinants of economic diversification (Esanov, 2012). However, a study on the determinants of economic diversification from a SSA perspective has not been discussed thoroughly by literature in order to emphasise the importance of effective economic diversification strategies (Spelman, 2006).

The panel regression model on the determinants of economic diversification from SSA perspective will be based on secondary data sourced from the World Bank and UNCTAD. Due to limited availability of data from UNCTAD, the panel regression model of this study is based on a 20 year period dataset (1995-2015). In addition, E-views 9.5 software will be used to perform all panel regression related work of this study.

4.2 Panel regression model outline

As in Haouas & Heshmati (2014), a regression model is used to determine the various factors which contribute to economic diversification. It is assumed that economic diversification is driven by economic and non-economic variables. The panel regression model of this study is depicted in the equations below:

Panel regression model 1

$$\text{Diversification}_{it} = \beta_0 + \beta_1 \text{LGDPPER}_{it} + \beta_2 \text{Inflation}_{it} + \beta_3 \text{CA}_{it} + \beta_4 \text{FDI}_{it} + \beta_5 \text{GS}_{it} + \beta_6 \text{LifeExpec}_{it} + \beta_7 \text{GQ}_{it} + \varepsilon_{it} \quad (4)$$

Panel regression model 2

$$\text{Concentration}_{it} = \beta_0 + \beta_1 \text{LGDPPER}_{it} + \beta_2 \text{Inflation}_{it} + \beta_3 \text{CA}_{it} + \beta_4 \text{FDI}_{it} + \beta_5 \text{GS}_{it} + \beta_6 \text{LifeExpec}_{it} + \beta_7 \text{GQ}_{it} + \varepsilon_{it} \quad (5)$$

where, LGDPPER is GDP per capita for country *i* at time *t* in its log form; Inflation is the annual percentage change in consumer prices; Current Account (CA) is expressed as a percentage of GDP; Foreign Direct Investment (FDI) is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as a percentage of GDP; GS is gross savings as a percentage of GDP;

LifeExpec is life expectancy at birth; GQ is the government quality composite statistic which encapsulates all six Worldwide Governance Indicators (CC: Control of Corruption | GE: Governance Effectiveness | PS: Political Stability | RQ: Regulatory Quality | RL: Rule of Law | VA: Voice and Accountability)[23]. The GQ composite statistic was calculated by equally weighting all six governance indicators.

It is important to note that the only difference between the two panel regression models is the dependent variable. In regression model 1 the dependent variable is the UNCTAD diversification index and in regression model 2 the dependent variable is the UNCTAD concentration index. In order to determine which governance variable has the most statistically significant nexus with economic diversification, regressions will be conducted on each of the six Worldwide Governance Indicators in both panel regression models respectively. For more detail on the above panel regression variables, please refer to Table 32 in the appendix.

4.3 Limitations of the economic diversification panel regression model

There are three main quantitative limitations of this regression model on the determinants of economic diversification. Firstly, "models by their very nature are only an approximation of reality and are limited by their input data. They cannot be perfect predictors of the future and they should not be regarded as such. However they are, and should remain, an integral part in the decision-making process" (Botha, 2009: 2). Thus, this economic diversification panel regression model given its limitations, is still an important analysis tool in order to provide insightful recommendations from a SSA perspective.

Secondly, since SSA is the focal point on this study, there are challenges in terms of frequent missing data points of relevant explanatory variables from secondary data sources (e.g. the World Bank database). For example, access to electricity as a percentage of the population was omitted from the panel regression model due to missing data points. Furthermore, DRC does not have any data points in terms of the prevalence of undernourishment as a percentage of its population. Thus, the panel regression model of this study is restricted due to the availability of data from reputable secondary data sources which include UNCTAD and World Bank databases.

The final limitation is that the panel regression models of this study only have a time series of 20 years (1995-2015). The reason behind this restriction is due to UNCTAD, which only has a 1995-2015 dataset at this point in time. Ideally, a longer time series is preferred but 20 years will be sufficient in order to run the panel regression models on the determinants of the economic diversification from a SSA

[23] The six Worldwide Governance Indicators in their original form have a rating scale of -2.5 (bad governance) to 2.5 (good governance.). In order to compute a composite statistic on government quality (GQ), the author of this study converted the rating scale: 0 (bad governance) to 1 (good governance).

perspective (Parteka & Tamberi, 2011). For more insight on Econometrics, panel data regression model analysis, and it's inherit limitations; please refer to Gujarati & Porter (2009) and Brooks (2008).

4.4 The analytical scope of this study

The SSA region is the geographical area which this study will be focussing on from a quantitative point of view, in order to analyse the relationship between economic diversification and its respective determinants. There are 48 countries which are encapsulated within the SSA category. This study will focus its analytical scope on the 20 largest SSA economies based on nominal GDP, because they are considered to be the most powerful nations from an economic aspect. For more insight on the selected SSA economies, please refer to Table 15.

Table 15: The 20 largest SSA economies (GDP) in 2015

Country	GDP (millions of US dollars)	World ranking (out of 195 countries)
1. Nigeria	481,066	23
2. South Africa	312,798	33
3. Angola	102,643	60
4. Sudan	84,067	65
5. Kenya	63,398	73
6. Ethiopia	61,537	74
7. Tanzania	44,895	85
8. Ghana	37,864	89
9. DRC	35,238	94
10. Côte d'Ivoire	31,753	97
11. Cameroon	29,198	98
12. Uganda	26,369	103
13. Zambia	21,202	106
14. Mozambique	14,639	116
15. Botswana	14,391	117
16. Gabon	14,340	118
17. Zimbabwe	13,893	121
18. Senegal	13,780	122
19. Mali	13,100	123
20. Namibia	11,546	128

Source: World Bank Development Indicators online database.

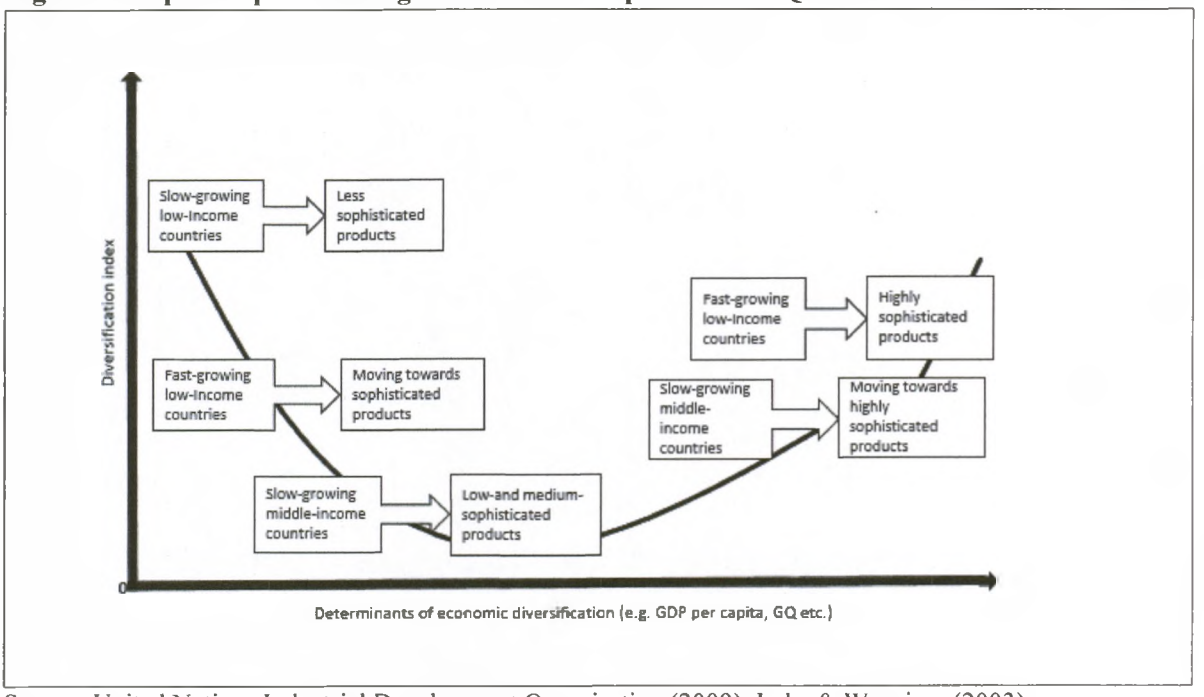
4.5 Panel regression estimators and expected results of independent variables

In terms of panel regression models, there are three main methods used as quantitative estimators. The three panel regression estimators include: pooled OLS model, fixed effects model (FEM) and random effects model (REM). These panel regression estimators differ from one another because of their respective properties, advantages and disadvantages. For example, the main disadvantage of the pooled OLS model is that it does not take into account the heterogeneity that exists among the 20 largest SSA economies dataset. Therefore, the appropriate estimator method for this study will either be the FEM or

REM. The Hausman test will be used to determine which panel regression model estimator is the most appropriate for this study. If the p-value of the Hausman test is greater than 5%, it indicates that REM is the appropriate panel regression estimator relative to FEM[24].

Based on economic theory and empirical evidence it is expected that government quality over the long-term will have a positive relationship with economic diversification (Imbs & Wacziarg, 2003). In this study, government quality (GQ) consists of the following characteristics based on Worldwide Governance Indicators (CC: Control of Corruption | GE: Governance Effectiveness | PS: Political Stability | RQ: Regulatory Quality | RL: Rule of Law | VA: Voice and Accountability). In order to illustrate graphically the expected positive coefficient of GQ over the long-run, please refer to Figure 7.

Figure 7: Expected positive long-term relationship between GQ and economic diversification



Source: United Nations Industrial Development Organisation (2009); Imbs & Wacziarg (2003).

GQ is an essential diversification determinant which can propel low income SSA economies towards attaining socio-economic development standards which are synonymous with high income countries. Low income economies, such as Angola tend to have poor economic diversification because they are highly dependent on a narrow export basket based on natural resources which are susceptible to external shocks and mineral depletion. One of the main reasons why SSA economies are poor is due to inadequate GQ during the colonial era and post-colonial era respectively (Rodney, 1973; Rotberg,

[24] The null hypothesis of the Hausman test in this study on the determinant of economic diversification from a SSA perspective, is as follows: REM is appropriate (p-value > 5%).

2003). Once good governance and political will are used to implement effective economic diversification strategies, it is expected that in the long-run economic diversification will have a positive relationship with GQ. From a continental perspective, Agenda 2063 is SSA's long-term development path which articulates the vision of implementing structural reforms which will manifest into sustainable socio-economic growth (African Union, 2015). In essence, it is expected that the economic and non-economic determinants of economic diversification will have a negative coefficient in the short-run (low-income countries) and a positive coefficient over the long-term (high-income countries) as depicted in the U-shaped development path in Figure 7.

Furthermore, two different economic diversification UNCTAD indices are used in order to mitigate the risk of having a non-stationary dependent variable which could led to spurious regression results. The following panel regression unit root tests from E-Views 9.5 will be used in this study: (1) Levin, Lin & Chu t*, (2) Im, Pesaran and Shin W-stat, (3) ADF Fisher Chi-square and (4) PP Fisher Chi-Square. Unit-root pretesting will be conducted on all independent and dependent variables to ensure stationarity before panel data regression analysis is used to test the hypothesis of this study. It is important to note that any variable which is found to be non-stationary will be tested in its first differentiated form respectively. In addition, a correlation matrix will be used to detect multicollinearity between independent variables of the panel regression model.

4.6 Diagnostic tests

After analysing the panel regression model results, this study will conduct diagnostic tests in order to verify the reliability of the determinants of economic diversification model, from a SSA perspective. In terms of E-Views 9.5, there are only three residual diagnostics tests that are applicable to panel regression models. Firstly, the Jarque-Bera test will be used to examine normality of the panel regression model residuals. The second test is the Breusch-Pagan LM which will be used to check for cross-section dependence (correlation) of panel regression residuals. Lastly, the Arrellano-Bond test will be used to detect serial correlation.

4.7 Conclusion

In summary, the above information was intended to provide insight on the panel regression model methodology of this study. The hypothesis that will be tested using the above economic diversification panel regression model is as follows:

H_0: There is a statistically significant relationship between economic diversification and government quality.

H_1: There is no statistically significant relationship between economic diversification and government quality.

In the subsequent chapter, the panel regression model will be used in order to test the above hypothesis of this study. It is expected that GQ, which is a composite statistic of government quality, will be statistically significant in relation to economic diversification. In addition, the six underlying government variables within GQ will be analysed individually in order to determine which one is the most statistically significant relative to economic diversification.

CHAPTER FIVE: ESTIMATION OF PANEL REGRESSION RESULTS

5.1 Introduction

In the previous chapter, the panel regression methodology of economic diversification from a SSA perspective was outlined. The purpose of this chapter is to apply the panel regression methodology in order to test the hypothesis in respect of government quality and its relationship with economic diversification. E-Views 9.5 was used in order to perform all empirical panel regression evidence in this study.

Chapter 5 will commence with stationarity test on all variables. Secondly, it will provide a correlation matrix which will be used to test for multicollinearity between the independent variables of this study. The third phase of the econometric analysis on the determinants of economic diversification will determine which panel regression model estimator is appropriate between REM and FEM based on the Hausman test. Thereafter, the hypothesis test between government quality (GQ) and economic diversification will be analysed in order to determine whether the relationship between both variables is statistically significant. Lastly, diagnostic tests will be conducted in order to ensure that quantitative findings of this study are robust.

5.2 Stationarity tests

The first step which is mandatory when conducting panel regression model analysis is to test for unit root in order to ensure that all variables are stationary. In terms of E-Views 9.5, there are four measures that can used for unit root testing. The four unit root tests include: (1) Levin, Lin & Chu t*, (2) Im, Pesaran and Shin W-stat, (3) ADF Fisher Chi-square and (4) PP Fisher Chi-Square. Table 16 shows variables that were stationary.

Table 16: Stationary variables without first differencing

Variable	Levin, Lin & Chu t* (p-value)	Im, Pesaran and Shin W-stat (p-value)	ADF (p-value)	PP (p-value)
Diversification	0.0002*	0.0000*	0.0000*	0.0000*
GQ	0.0000*	0.0000*	0.0000*	0.0000*
CA	0.0000*	0.0000*	0.0000*	0.0000*
CC	0.0000*	0.0000*	0.0000*	0.0000*
FDI	0.0000*	0.0000*	0.0000*	0.0000*
GE	0.0000*	0.0003*	0.0012*	0.0000*
GS	0.0001*	0.0000*	0.0000*	0.0000*
Inflation	0.0000*	0.0000*	0.0000*	0.0000*
LifeExpec	0.0000*	0.0000*	0.0000*	0.9999

Note:*, **, ***, denotes stationary at 1%, 5% and 10% significance respectively.

Including the six Worldwide Governance Indicators, there are a total of 15 variables which have a bearing on the panel regression model of this study. In Table 16, it can be observed that only nine variables were stationary. It is interesting to point out that LifeExpec is stationary in three out of the four unit root tests which are available from E-Views 9.5. First differencing was used to check the LifeExpec variable and the unit root test results indicate that such an approach would be inappropriate (Levin, Lin & Chu t*: 1.0000 | Im, Pesaran and Shin W-stat: 1.0000 | ADF Fisher Chi-square: 0.9985 | PP Fisher Chi-Square: 0.9999). Therefore, the LifeExpec variable is considered to be stationary without the need of first differencing.

Table 17: Non-stationary variables without first differencing

Variable	Levin, Lin & Chu t* (p-value)	Im, Pesaran and Shin W-stat (p-value)	ADF (p-value)	PP (p-value)
Concentration	0.1434	0.0611***	0.0723***	0.0023*
LGDPPER	0.2940	1.0000	0.9582	1.0000
PS	0.0548***	0.1445	0.2465	0.1542
RL	0.3125	0.5372	0.2701	0.0544
RQ	0.0234**	0.0153**	0.0130*	0.1067
VA	0.0000*	0.1857	0.3617	0.9719

Note:*, **, ***, denotes stationary at 1%, 5% and 10% significance respectively.

Table 17 depicts the remaining six out of 15 variables which have been assessed to be non-stationary when first differencing is not put in place. Concentration index which is the dependent variable in regression model 2, is not stationary in one out of the four panel regression unit root tests (Levin, Lin & Chu t*: 0.14 p-value). The above variables were first differenced on E-Views 9.5 in order to check whether their respective p-values would become stationary. Please refer to the Table 18 for the first differencing results.

Table 18: Stationary variables with first differencing

Variable	Levin, Lin & Chu t* (p-value)	Im, Pesaran and Shin W-stat (p-value)	ADF (p-value)	PP (p-value)
D(Concentration)	0.0000*	0.0000*	0.0000*	0.0000*
D(LGDPPER)	0.0000*	0.0000*	0.0000*	0.0000*
D(PS)	0.0000*	0.0000*	0.0000*	0.0000*
D(RL)	0.0000*	0.0000*	0.0000*	0.0000*
D(RQ)	0.0000*	0.0000*	0.0000*	0.0000*
D(VA)	0.0000*	0.0000*	0.0000*	0.0000*

Note:*, **, ***, denotes stationary at 1%, 5% and 10% significance respectively.

Table 18 shows that when the first differencing approach is implemented in the above variables, all variables become stationary. All 15 variables that have a bearing on this study are now stationary in nature. The next step of this panel regression analysis on the determinants of economic diversification from a SSA perspective is the correlation matrix.

5.3 Correlation matrix of panel regression independent variables

Now that all the 15 variables of this study are stationary based on unit root testing on E-Views 9.5, let's briefly examine the correlation matrix in Table 19.

Table 19: Correlation matrix of independent variables

	DLGDPPER	INFLATION	CA	FDI	GS	LIFEEXPEC	GQ
DLGDPPER	1.0000	-0.0846	0.0130	-0.0824	0.0716	0.1300	0.0972
INFLATION	-0.0846	1.0000	0.1856	0.0213	0.0270	-0.2103	-0.1401
CA	0.0130	0.1856	1.0000	-0.0007	0.6312	-0.0213	0.1494
FDI	-0.0824	0.0213	-0.0007	1.0000	0.0422	-0.1461	-0.1142
GS	0.0716	0.0270	0.6312	0.0422	1.0000	0.0814	0.1562
LIFEEXPEC	0.1300	-0.2103	-0.0213	-0.1461	0.0814	1.0000	0.3138
GQ	0.0972	-0.1401	0.1494	-0.1142	0.1562	0.3138	1.0000

There are three correlation categories: high correlation, medium correlation and low correlation. Multicollinearity occurs when there is a high correlation between independent variables. A correlation matrix is used to detect multicollinearity (Brooks, 2008). The highest observed correlation is 0.6313 between the CA and GS variables, which is ignored from a statistical point of view because it's considered to be at a reasonable level (medium correlation). On the other hand, the lowest observed correlation is -0.0007 between FDI and CA independent variables. Generally speaking, the independent variables of this panel regression model do not have the problem of multicollinearity. The summary statistics of the main panel regression model variables, are depicted in Table 20.

Table 20: Summary statistics of panel regression variables

	Mean	Std.dev	Min	Max
DIVERSIFICATION	0.7873	0.0785	0.5020	0.9217
CONCENTRATION	-0.0027	0.0663	-0.5420	0.5960
DLGDPPER	0.0236	0.0429	-0.2091	0.2649
INFLATION	43.2226	254.8789	-8.4842	4145.1080
CA	-3.3326	9.6024	-46.7169	43.3956
FDI	3.9263	5.7766	-8.5894	41.8096
GS	18.0955	14.2992	-21.4600	69.7060
LIFEEXPEC	54.2671	5.8784	40.6791	66.3725
GQ	0.06268	0.0215	0.0121	0.1249

5.4 Hausman test

As stated in the methodology chapter, there are three main estimators of panel data modelling. The three estimators include: pooled OLS model, fixed effects model (FEM) and random effects model (REM). In this study, only FEM or REM will be used to analyse the relationship between economic diversification and government quality (GQ).

The Hausman test will be used to determine whether the FEM or REM, is the appropriate estimator for this study. The Hausman test results for regression model 1 and regression model 2 are provided below:

Table 21: Regression model 1 (Hausman test)

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.892783	7	0.2604

Based on the p-value of 0.2604 (26.04%) in the above Hausman test (Table 21), indicates that the REM is the appropriate panel estimator for regression model 1, where the dependent variable is the UNCTAD diversification index. In terms of regression model 2 which has the UNCTAD concentration index as the dependent variable, the Hausman test also indicates that the REM is the most appropriate panel regression model estimator for this study. For more insight on the regression model 2 Hausman test results, please refer to Table 22.

Table 22: Regression model 2 (Hausman test)

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.652645	7	0.8188

** WARNING: estimated cross-section random effects variance is zero.

The p-value in Table 22 is greater than 5%, which indicates that the REM model is the most appropriate estimator relative to FEM. However, it is important to note the warning in Table 22, which states that the estimated cross-section random effects variance is zero in respect of regression model 2. In order to determine why the warning from E-Views 9.5 had occurred, regression model 2 was estimated using all three panel regression model estimators[25]. The results of regression model 2 were inadequate because all independent variables are statistically insignificant in each panel regression model estimator respectively. From the additional analysis, it was concluded that the differences in the dependent

[25] The panel regression results (pooled OLS | FEM | REM) of regression models 2 are available on the appendix. In all three models, the independent variables are statistically insignificant. The main reason behind this occurrence is mainly due to the fact the independent variable in regression model 2 required first differencing in order to achieve stationarity.

variable in regression model 1 (UNCTAD diversification index | did not require first differencing to become stationary) and regression model 2 (UNCTAD concentration index | did require first differencing to become stationary), is the main reason behind the statistically insignificant results in regression model 2. Therefore, this study will only focus on analysing the REM in respect of regression model 1, for hypothesis testing purposes.

5.5 REM panel regression model results

The hypothesis of this study is as follows:

H_0: There is a statistically significant relationship between economic diversification and government quality.

H_1: There is no statistically significant relationship between economic diversification and government quality.

In order to conduct the above hypothesis test, the REM panel regression was used, based on a dataset which consists of the 20 largest SSA economies. Please refer to Table 23 for the quantitative results.

Table 23: Regression model 1 (REM estimator)

Dependent Variable: DIVERSIFICATION
Method: Panel EGLS (Cross-section random effects)
Date: 02/27/17 Time: 22:55
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	-0.009995	0.044323	-0.225503	0.8217
INFLATION	-2.55E-06	8.19E-06	-0.311736	0.7554
CA	-0.000262	0.000295	-0.887183	0.3755
FDI	-0.000867	0.000347	-2.497488	0.0129
GS	-0.000204	0.000299	-0.684523	0.4940
LIFEEXPEC	-0.002711	0.000453	-5.986978	0.0000
GQ	0.500856	0.207448	2.414368	0.0162
C	0.909816	0.030297	30.02980	0.0000

Effects Specification	S.D.	Rho
Cross-section random	0.073235	0.8324
Idiosyncratic random	0.032867	0.1676

Weighted Statistics			
R-squared	0.111492	Mean dependent var	0.078591
Adjusted R-squared	0.095626	S.D. dependent var	0.034645
S.E. of regression	0.032947	Sum squared resid	0.425507
F-statistic	7.027028	Durbin-Watson stat	0.905211
Prob(F-statistic)	0.000000		

In Table 23, it can be observed that GQ, FDI and LifeExpec are the only independent variables which are statistically significant, in relation to the dependent variable which is the UNCTAD diversification index. The coefficient of GQ is positive, which is in line the U-shaped empirical findings from Imbs & Wacziarg (2003). When economic diversification strategies are implemented effectively over the long-run, it was expected that the GQ of a given SSA economy will be positive after the development transition occurs from low-income levels to high-income levels[26]. The above results indicate that the expected positive relationship over the long-run between economic diversification and GQ is statistically significant. Therefore, the null hypothesis based on the REM estimator is not rejected (there is a statistically significant relationship between economic diversification and government quality).

For additional information purposes, the above REM estimator was used to determine the relationship between economic diversification and each of six worldwide indicators which are encapsulated within the GQ composite statistic. The REM regression model was conducted six times by replacing GQ with each Worldwide Governance Indicator respectively (CC: Control of Corruption | GE: Governance Effectiveness | PS: Political Stability | RQ: Regulatory Quality | RL: Rule of Law | VA: Voice and Accountability). See the summarised results in Table 24.

Table 24: Worldwide Governance Indicators (REM estimator results)

World Governance Indicators	Coefficient	T- Statistics	P-Value	R Squared
CC	0.1062	2.9690	0.0032**	0.8361
GE	0.1161	3.1305	0.0019**	0.8365
D(PS)	-0.0289	-0.7143	0.4755	0.8325
D(RQ)	0.0138	0.1949	0.8456	0.8322
D(RL)	0.0422	0.6235	0.5333	0.8324
D(VA)	0.0485	0.7092	0.4787	0.8325

Note:*, **, ***, denotes stationary at 1%, 5% and 10% significance respectively.

From Table 24, it can be observed that only CC and GE are statistically significant relative to the other Worldwide Governance Indicators, which required first differencing in order to be become stationary. Generally speaking, it is well known fact that SSA has suffered from weak governance which hinders inclusive socio-economic development. It is interesting to note that PS is the only governance variable that has a negative coefficient. This finding points out that political stability should be implemented first from a governance point of view, in order to stimulate economic diversification in the initial phase of the U-shaped development path.

[26] For graphical illustration of the U-shaped development path, please refer to Figure 7 (Chapter 4).

5.6 Diagnostic tests of REM panel regression residuals

In order to verify the reliability of the estimated REM economic diversification model, diagnostic tests were performed. The diagnostic tests examine the following respective factors: normality, cross-section dependence and serial correlation. Results from the diagnostic tests are depicted in Table 25.

Table 25: REM panel regression diagnostic test results

Diagnostic test	P-Value	Conclusion
Breusch-Pagan LM test	0.0000	No cross-section dependence in residuals
Jarque-Bera test	0.0000	Not normally distributed
Arrelano-Bond serial correlation test	N/A	N/A

E-Views 9.5 only has three residual diagnostics tests in respect of panel regression analysis. Firstly, the Breusch-Pagan LM test indicates that there is no cross-section dependence (correlation) in the determinants of economic diversification REM panel regression residuals. The p-value of the Jarque-Bera test is less than 5%, which means that the residuals of this study are not normally distributed. However, given the large sample size of 400 observations, the violation of the normality assumption is inconsequential (Brooks, 2008). The test used to ascertain serial correlation is not available for REM because the Arrelano-Bond serial correlation test on E-Views only works for GMM equations estimated by first differences. It is thus assumed that there is no presence of serial correlation in the REM panel regression residuals.

5.7 Conclusion

After running the determinants of economic diversification panel regression model in E-Views 9.5, it was proven that there is a statistically significant relationship between economic diversification and GQ. The relationship between economic diversification and GQ is positive which means it occurs in the second stage of the diversification process according to empirical literature (Imbs & Waczairg, 2003). In addition, the REM panel regression estimator was deemed appropriate relative to FEM, based on the Hausman test.

Another key finding from this study was that the FDI and LifeExpec variables also have a statistically significant relationship with economic diversification, which is negative in nature. The negative relationship indicates that foreign direct investment, due to its cash flow injection and positive spill-over effects, is a key determinant that can help create a conducive socio-economic environment for effective diversification to take place. In terms of LifeExpec, it indicates that as human living standards improve, it will result in a given economy having a more diverse economic structure, which is resilient to external shocks.

It important to note that economic diversification is very complex and in reality it is a function of various variables which have not been included in this panel regression model. However, the regression results are useful and can be used to provide recommendations in the concluding chapter of this study.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

The research objectives of this study were twofold. Firstly, it had to determine the extent of economic diversification in selected SSA economies. The second objective was to investigate the main determinants of economic diversification. Different analytical methods were used to achieve the objectives of this study. In terms of the first objective, a trend analysis approach in respect of the UNCTAD diversification and concentration indices was used. Furthermore, a panel regression methodology was formulated, based on the conceptual and theoretical framework in order to analyse the relationship between economic diversification and its selected determinants.

In terms of the trend analysis in Chapter 3, the main finding was that the extent of economic diversification in SSA is inadequate relative to developed and developing economies. In Chapter 5, the null hypothesis was not rejected based on the REM panel regression results, because there is statistically significant relationship between economic diversification and government quality. Other key findings from the REM panel regression was that economic diversification also has a statistically significant relationship with life expectancy and foreign direct investment.

Economic diversification is a long-term development strategy which is created by government institutions with the mandate of reducing systemic risk from being highly dependent on a narrow export basket for real GDP growth and fiscal revenue. When government quality is inadequate, economic diversification is hindered. Although there are a various determinants of economic diversification, government quality is the cornerstone which provides the foundation for its manifestation over the long-run. SSA economies, such as Nigeria, Angola and Botswana will find themselves in a precarious position when their natural resource wealth becomes depleted if they do not implement effective economic diversification strategies. The main policy recommendations towards achieving effective economic diversification is encapsulated by the following aspects: structural reform and Group Economics.

Structural reform in SSA is pivotal in terms of transitioning from low income levels (poorly diversified) to high income levels (well-diversified). In order to induce a paradigm shift from negative thinking-habits to positive thinking-habits in SSA, reforms in the educational system are needed. By reforming the structure of the educational system, SSA economies will empower their people to become collaborative and productive. Secondly, infrastructure development is a required structural reform in order to create a business environment that is conducive for industrialisation. SSA economies need to invest in electricity production, roads and telecommunication infrastructure so that effective economic diversification can take place.

Group Economics is defined as a situation where a collective of people consciously pursue economic interests together in order to create a sustainable economy for themselves (Anderson, 2001). The

underlying principle of Group Economics is the existence of power in numbers. For example, Botswana on its own has a small nominal GDP size of US$14 billion but the collective size of the 20 largest SSA economies is approximately US$1.43 trillion. Economic diversification requires sufficient market size, intra-African trade and economies of scale so that countries are enabled to diversify their respective export baskets. The African Union is an example of Group Economics. However, the African Union at this point in time has not used the power of Group Economics effectively due to inadequate government quality, which has hindered economic diversification efforts.

In conclusion, SSA economies have what it takes to achieve effective economic diversification. What is needed is the proper use of political will stemming from government to create and implement a conducive environment. Besides government, other stakeholders, such as the private sector, foreign investors and the Diaspora can also play a role towards achieving economic diversification from a SSA perspective. By implementing the necessary structural reforms and engaging in effective Group Economics, SSA will rise from the proverbial ashes like a phoenix from its socio-economic woes.

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Appendix

Table 2A: Current account balance (% of GDP) of the 20 largest SSA countries

Current account balance (% of GDP)												
Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	3.49	18.20	25.58	17.50	8.55	-10.03	9.10	12.57	12.01	6.68	-2.93	-8.27
Botswana	3.92	15.94	18.75	14.97	1.35	-6.37	-2.79	3.03	-1.14	9.35	15.61	7.76
Ghana	-2.22	-4.50	-5.10	-8.57	-12.42	-6.16	-8.23	-8.95	-11.71	-11.93	-10.01	-7.92
Kenya	-0.81	-1.28	-1.94	-3.31	-5.43	-4.41	-5.92	-9.10	-8.36	-8.79	-9.77	-6.82
Mozambique	-11.47	-10.20	-9.09	-8.39	-9.98	-11.03	-16.54	-18.38	-44.48	-38.54	-37.14	-40.44
Nigeria	13.42	22.32	16.90	11.02	9.14	5.31	4.02	3.12	4.15	3.95	0.25	-3.12
South Africa	-2.79	-3.13	-4.45	-5.40	-5.64	-2.67	-1.48	-2.20	-5.10	-5.86	-5.30	-4.33
Tanzania	-3.77	-6.43	-5.91	-7.96	-9.41	-6.33	-7.11	-13.05	-9.71	-11.31	-10.45	-7.16
Uganda	-0.13	0.35	-2.52	-3.62	-6.86	-5.60	-8.26	-9.66	-6.75	-7.06	-8.72	-9.30
Zambia	-15.26	-10.60	-1.69	-4.66	-6.63	1.79	2.38	0.88	1.95	-5.07	-6.93	-9.33
Cameroon	-2.63	-2.99	1.08	1.40	-1.93	-4.78	-3.62	-2.81	-3.61	-3.81	-4.20	-4.28
Cote d'Ivoire	1.56	0.23	2.69	-0.68	1.86	6.66	1.87	10.49	-1.19	-2.02	-3.08	-1.90
Ethiopia	-6.59	-12.64	-11.69	-4.20	-6.67	-6.75	-1.42	-2.45	-6.89	-6.04	-8.62	-5.85
DRC	-2.97	-3.25	0.33	3.22	-0.79	-6.15	-10.59	-5.37	-4.59	-10.36	-5.25	-4.39
Mali	-7.51	-7.01	-3.17	-7.13	-10.91	-6.43	-11.14	-5.06	-2.19	-2.83	-6.22	-5.53
Namibia	6.76	4.59	13.57	8.57	3.03	-1.48	-3.46	-3.05	-5.70	-4.06	-7.43	-12.64
Senegal	-6.36	-7.76	-9.20	-11.62	-14.07	-6.66	-4.55	-7.94	-10.89	-10.80	-9.34	-8.84
Zimbabwe	-7.90	-10.20	-7.59	-6.64	-17.00	-16.60	-22.72	-29.72	-24.64	-25.42	-23.07	-17.79
Sudan	-3.81	-9.32	-18.13	-7.84	-6.59	-9.27	-2.63	-3.94	-9.98	-8.76	-4.80	-7.06
Gabon	11.92	20.96	17.07	15.30	23.36	7.54	8.75	13.23	13.98	12.12	6.69	-8.08

Source: NKC Research (2016); World Bank (2016).

Table 4A: Real GDP (%) of the 20 largest SSA economies

Real GDP growth (%)												
Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	10.88	18.26	20.74	22.59	13.82	2.41	3.41	3.92	5.16	6.81	4.80	3.00
Botswana	2.71	4.56	8.36	8.28	6.25	-7.65	8.56	6.05	4.46	9.86	3.21	-0.25
Ghana	5.35	6.20	4.55	4.35	9.15	4.85	7.90	14.05	9.29	7.31	3.99	3.89
Kenya	5.10	5.91	6.47	6.85	0.23	3.31	8.40	6.11	4.55	5.69	5.33	5.65
Mozambique	7.81	8.72	9.85	7.43	6.88	6.35	6.69	7.12	7.20	7.14	7.43	6.62
Nigeria	10.48	6.51	6.03	6.45	6.27	6.93	7.84	4.89	4.28	5.39	6.31	2.65
South Africa	4.55	5.28	5.60	5.37	3.20	-1.53	3.04	3.29	2.21	2.33	1.63	1.27
Tanzania	7.83	8.17	4.66	8.46	5.57	5.38	6.36	7.90	5.14	7.26	6.97	7.03
Uganda	6.81	6.33	10.78	8.41	9.08	6.91	8.21	5.92	3.24	4.73	4.87	5.55
Zambia	7.03	7.24	7.90	8.35	7.77	9.22	10.30	6.34	6.73	6.71	6.00	3.41
Cameroon	3.70	2.30	3.22	3.26	2.88	1.93	3.27	4.14	4.59	5.56	5.93	6.24
Cote d'Ivoire	1.23	1.72	1.52	1.77	2.54	3.25	2.02	-4.39	10.71	9.22	8.55	8.44
Ethiopia	13.57	11.82	10.83	11.46	10.79	8.80	12.55	11.18	8.65	10.58	10.28	9.61
DRC	6.74	6.14	5.32	6.26	6.23	2.86	7.08	6.86	7.16	8.50	8.97	6.92
Mali	-6.15	10.37	12.51	8.30	9.55	11.75	10.87	7.75	11.22	7.01	7.79	7.61
Namibia	12.27	2.53	7.07	6.62	2.65	0.30	6.04	5.09	5.06	5.65	6.33	5.66
Senegal	5.87	5.62	2.46	4.94	3.68	2.42	4.18	1.76	4.41	3.49	4.31	6.49
Zimbabwe	-5.81	-5.71	-3.46	-3.65	-17.67	5.98	11.38	11.91	10.57	4.48	3.85	1.07
Sudan	3.88	7.49	10.06	11.52	7.80	3.24	3.47	-1.97	-2.21	3.30	3.10	3.44
Gabon	0.69	3.90	-3.63	5.66	-3.31	0.13	7.09	7.09	5.25	5.64	4.31	3.86

Source: World Bank (2016).

Table 5A: Inflation rate (annual %) of the 20 largest SSA countries

Consumer Price Inflation (%)												
Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	43.54	22.96	13.30	12.25	12.47	13.73	14.47	13.47	10.29	8.78	7.28	10.28
Botswana	6.94	8.62	11.56	7.08	12.70	8.03	6.95	8.46	7.54	5.92	4.42	3.04
Ghana	12.63	15.12	10.92	10.73	16.52	19.25	10.71	8.73	9.16	11.61	15.49	17.15
Kenya	11.64	10.31	14.44	9.76	26.25	9.23	3.96	14.02	9.38	5.73	6.87	6.59
Mozambique	12.66	7.16	13.24	-3.06	14.50	3.79	12.43	11.17	2.60	4.26	2.56	3.55
Nigeria	15.01	17.87	8.23	5.38	11.58	11.54	13.71	10.84	12.22	8.47	8.06	9.01
South Africa	1.42	3.34	4.65	7.10	10.97	7.16	4.27	4.99	5.66	5.75	6.07	4.58
Tanzania	4.74	5.03	7.25	7.03	10.28	12.14	6.20	12.69	16.00	7.87	6.13	5.60
Uganda	3.67	8.61	7.22	6.09	12.03	13.01	4.00	18.66	14.03	5.46	4.30	5.32
Zambia	17.99	18.33	9.01	10.66	12.45	13.39	8.51	6.43	6.58	6.97	7.81	10.11
Cameroon	0.23	2.01	5.12	0.92	5.34	3.04	1.28	2.94	2.94	1.95	1.95	2.69
Cote d'Ivoire	1.46	3.89	2.47	1.89	6.31	1.02	1.23	4.91	1.30	2.58	0.45	1.24
Ethiopia	3.26	12.94	12.31	17.24	44.39	8.47	8.14	33.22	22.77	8.08	7.39	10.13
DRC	3.99	21.32	13.05	16.95	17.30	2.80	7.10	15.32	9.72	1.63	5.68	8.09
Mali	-3.10	6.40	1.54	1.41	9.17	2.46	1.11	2.86	5.43	-0.61	0.90	1.44
Namibia	4.14	2.28	4.96	6.55	9.09	9.45	4.87	5.01	6.72	5.60	5.35	3.41
Senegal	0.51	1.70	2.11	5.85	5.77	-2.25	1.23	3.40	1.42	0.70	-1.08	0.15
Zimbabwe	282.38	302.12	1096.68	450.59	512.69	459.46	3.03	3.28	3.92	1.63	-0.22	-2.40
Sudan	8.42	8.52	7.20	7.98	14.31	11.25	13.25	22.11	37.39	29.96	36.91	16.91
Gabon	0.41	3.71	-1.41	5.03	5.26	1.89	1.46	1.27	2.66	0.48	4.66	2.27

Source: NKC African Economics (2016); World Bank (2016).

Table 6A: Unemployment rate (% of labour force) of the 20 largest SSA economies

Unemployment rate (% of labour force)												
Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Angola	6.90	6.80	6.80	6.70	6.80	6.90	6.90	6.90	6.90	6.90	6.80	6.86
Botswana	22.90	22.00	17.60	18.50	21.90	18.40	17.90	17.80	17.70	17.60	18.20	20.33
Ghana	6.90	3.80	3.60	2.80	4.30	2.20	5.30	4.60	3.60	1.80	2.40	5.90
Kenya	9.60	9.50	9.50	9.40	9.40	9.40	9.30	9.20	9.20	9.10	9.20	9.54
DRC	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.00	8.19
Mozambique	22.70	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.60	22.50	22.60	22.86
Nigeria	7.70	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.50	7.50	7.50	7.57
South Africa	24.70	23.80	22.60	22.30	22.70	23.70	24.70	24.70	25.00	24.60	25.10	24.08
Tanzania	3.00	2.50	4.30	2.00	2.50	2.50	3.00	3.50	3.20	2.90	3.10	3.67
Uganda	2.50	2.00	3.60	3.00	3.60	4.20	4.20	4.20	4.20	4.20	3.80	3.23
Zambia	15.30	15.90	15.60	15.20	15.60	14.80	13.20	13.20	13.10	13.10	13.30	14.41
Cameroon	5.10	4.40	4.10	4.10	4.20	4.50	4.10	4.10	4.10	4.10	4.30	5.39
Cote d'Ivoire	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.00	4.09
Ethiopia	5.40	5.40	5.30	5.30	5.20	5.10	5.20	5.20	5.60	5.00	5.20	5.98
Mali	8.80	8.50	8.30	8.50	8.40	8.50	8.10	8.10	8.10	8.10	8.10	8.38
Namibia	21.90	20.20	21.70	19.40	37.60	29.70	22.10	19.80	16.70	19.00	18.60	21.21
Senegal	9.10	9.20	10.00	8.80	9.40	9.90	9.10	10.40	10.30	10.30	10.00	9.46
Zimbabwe	4.20	4.60	5.10	5.10	5.70	6.40	5.50	5.40	5.30	5.30	5.40	5.48
Sudan	14.80	14.70	14.80	14.70	14.80	14.60	14.60	14.60	14.60	14.60	14.80	14.81
Gabon	20.90	20.90	21.00	21.10	21.20	21.30	20.40	20.40	20.30	20.30	19.70	20.53

Source: World Bank (2016).

Table 7A: HDI of the 20 largest SSA countries

Country	2014 (HDI score)	2013 (HDI score)	2012 (HDI score)	World ranking (out of 188 countries)
Nigeria	0.514	0.510	0.505	152
South Africa	0.666	0.663	0.659	117
Angola	0.532	0.530	0.524	149
Sudan	0.479	0.477	0.476	165
Kenya	0.548	0.544	0.539	145
Ethiopia	0.442	0.436	0.429	175
Tanzania	0.521	0.516	0.510	151
Ghana	0.579	0.577	0.572	140
DRC	0.433	0.430	0.423	176
Côte d'Ivoire	0.462	0.458	0.452	172
Cameroon	0.512	0.507	0.501	153
Uganda	0.483	0.478	0.476	163
Zambia	0.586	0.580	0.576	139
Mozambique	0.416	0.413	0.408	180
Botswana	0.698	0.696	0.691	106
Gabon	0.684	0.679	0.673	111
Zimbabwe	0.509	0.501	0.491	158
Senegal	0.466	0.463	0.461	170
Mali	0.419	0.416	0.414	179
Namibia	0.628	0.625	0.620	128

Source: UNDP (2015)

Table 8A: DTF index of the 20 largest SSA countries in 2015

Country	DTF Index (out of 100)	World ranking (out of 189 countries)
Nigeria	47.33	170
South Africa	71.08	43
Angola	41.85	181
Sudan	49.55	160
Kenya	54.98	136
Ethiopia	59.31	132
Tanzania	56.38	131
Ghana	65.24	70
DRC	43.29	178
Côte d'Ivoire	52.26	147
Cameroon	49.85	158
Uganda	51.11	150
Zambia	59.65	111
Mozambique	56.92	127
Botswana	64.87	74
Gabon	53.43	144
Zimbabwe	46.95	171
Senegal	49.37	161
Mali	52.59	146
Namibia	62.81	88

Source: World Bank (2015).

Table 12A: UNCTAD diversification index averages of the 20 largest SSA countries

Country	Average index score (1995-1999)	Average index (2000-2005)	Average index (2006-2010)	Average index (2011-2015)
Angola	0.8651	0.8414	0.8323	0.8445
Botswana	0.8806	0.8978	0.8593	0.9013
Cameroon	0.8217	0.7922	0.7501	0.7369
Côte d'Ivoire	0.7915	0.7690	0.7155	0.7146
Ethiopia	0.7524	0.8292	0.8062	0.7924
DRC	0.8300	0.8078	0.8201	0.8147
Kenya	0.7198	0.7311	0.6769	0.6421
Mali	0.8165	0.8412	0.8434	0.8358
Mozambique	0.7363	0.8142	0.7913	0.7645
Namibia	0.7828	0.7819	0.7906	0.7592
Nigeria	0.8885	0.8685	0.8327	0.8110
Senegal	0.7929	0.7401	0.7328	0.7249
South Africa	0.5177	0.5534	0.5695	0.5352
Tanzania	0.7750	0.7993	0.7540	0.7685
Uganda	0.8723	0.8122	0.7601	0.7258
Zambia	0.8521	0.8533	0.8432	0.8314
Zimbabwe	0.7526	0.7670	0.7596	0.7994
Sudan	0.8006	0.8208	0.8249	0.8160
Ghana	0.8180	0.8272	0.8114	0.7620
Gabon	0.8365	0.8639	0.8360	0.8284

Source: UNCTAD (2015). Please note: The average index score is the author's own calculations.

Table 13A: UNCTAD concentration index averages of 20 largest SSA countries

Country	Average index score (1995-1999)	Average index (2000-2005)	Average index (2006-2010)	Average index (2011-2015)
Angola	0.8753	0.9183	0.9532	0.9517
Botswana	0.7091	0.7394	0.5848	0.7924
Cameroon	0.3423	0.4120	0.4151	0.3931
Côte d'Ivoire	0.3572	0.3582	0.3407	0.3537
Ethiopia	0.5826	0.3886	0.3565	0.3683
DRC	0.5651	0.5396	0.3475	0.4346
Kenya	0.2388	0.2356	0.1980	0.2024
Mali	0.6886	0.6035	0.5765	0.5621
Mozambique	0.3381	0.4920	0.4205	0.2950
Namibia	0.3346	0.3971	0.2434	0.2343
Nigeria	0.8831	0.8827	0.8355	0.7656
Senegal	0.2281	0.2242	0.2639	0.2211
South Africa	0.1139	0.1326	0.1491	0.1329
Tanzania	0.2496	0.2362	0.1915	0.1993
Uganda	0.6485	0.3020	0.2233	0.1911
Zambia	0.5625	0.4939	0.6282	0.6390
Zimbabwe	0.2702	0.2766	0.2160	0.2947
Sudan	0.3041	0.5040	0.7073	0.6386
Ghana	0.3518	0.3957	0.4657	0.4133
Gabon	0.7445	0.7420	0.7266	0.7151

Source: UNCTAD (2015). Please note: The average index score is the author's own calculations.

Table 26: Top eight largest economies in the world (GDP) in 2015

Country	GDP (millions of US dollars)	World ranking (out of 195 countries)
United States of America	17,946,996	1
China	10,866,444	2
Japan	4,123,258	3
Germany	3,355,772	4
United Kingdom	2,848,755	5
France	2,421,682	6
India	2,073,543	7
Italy	1,814,763	8

Source: World Bank (2015).

Table 27: CPI scores of the 20 largest SSA economies

Country	2015 (score)	2014 (score)	2013 (score)	2012 score)
Botswana	63	63	64	65
Namibia	53	54	52	57
Ghana	47	48	46	45
Senegal	44	43	41	36
South Africa	44	44	42	43
Zambia	38	38	38	37
Mali	35	32	28	34
Gabon	34	37	34	35
Ethiopia	33	33	33	33
Côte d'Ivoire	32	32	27	29
Mozambique	31	31	30	31
Tanzania	30	31	33	35
Cameroon	27	27	25	26
Nigeria	26	24	25	27
Kenya	25	25	27	27
Uganda	25	26	26	29
DRC	22	22	22	21
Zimbabwe	21	21	21	20
Angola	15	19	23	22
Sudan	12	11	11	13

Source: Transparency International (2015). CPI indicates the perceived level of public sector corruption on a scale of 0 (highly corrupt) to 100 (very clean).

Table 28: Top eight economies with lowest levels of corruption from a CPI perspective

Country	2015 (score)	2014 (score)	2013 (score)	2012 score)
Denmark	91	92	91	90
Finland	90	89	89	90
Sweden	89	87	89	88
New Zealand	88	91	91	90
Netherlands	87	83	83	84
Norway	87	86	86	85
Switzerland	86	86	85	86
Singapore	85	84	86	87

Source: Transparency International (2015). CPI indicates the perceived level of public sector corruption on a scale of 0 (highly corrupt) to 100 (very clean).

Table 29: Global Competitiveness Index (GCI) of the 20 largest SSA economies in 2016

Country	GCI Score (1 -7)	World ranking (out of 140 countries)
South Africa	4.39	49
Botswana	4.19	71
Namibia	3.99	85
Côte d'Ivoire	3.93	91
Zambia	3.87	96
Kenya	3.85	99
Gabon	3.83	103
Ethiopia	3.75	109
Senegal	3.73	110
Cameroon	3.69	114
Uganda	3.66	115
Ghana	3.58	119
Tanzania	3.57	120
Nigeria	3.46	124
Zimbabwe	3.45	125
Mali	3.44	127
Mozambique	3.20	133
Angola	N/A	N/A
DRC	N/A	N/A
Sudan	N/A	N/A

Source: Schwab *et al.* (2016). Please note than Angola, DRC (Democratic Republic of Congo) and Sudan are not ranked in the GCI. In addition, GCI quantifies the impact of a number of key factors which contribute to create conditions for competitiveness, with particular focus on the macroeconomic environment, quality of institutions, and the state of the country's technology and supporting infrastructure. GCI indicates global competitiveness on a scale of 1 (low competitiveness) to 100 (very high competitiveness).

Table 30: Top eight GCI economies in 2016

Country	GCI Score (1 -7)	World ranking (out of 140 countries)
Switzerland	5.76	1
Singapore	5.68	2
United States of America	5.61	3
Germany	5.53	4
Netherlands	5.50	5
Japan	5.47	6
Hong Kong	5.46	7
Finland	5.45	8

Source: Schwab *et al.* (2016).

Table 31: Money that has been looted by SSA post-colonial political elite

President/head of state	Country	Amount looted (estimated)
General Sani Abacha	Nigeria	US$20 billion
President H. Boigny	Côte d'Ivoire	US$6 billion
General Ibrahim Babangida	Nigeria	US$5 billion
President Mobutu	Zaire	US$4 billion
President Mouza Traore	Mali	US$2 billion
President Henri Bedie	Côte d'Ivoire	US$300 million
President Denis N'gnesso	Congo	US$200 million
President Omar Bongo	Gabon	US$80 million
President Paul Biya	Cameroon	US$70 million
President Haite Mariam	Ethiopia	US$30 million
President Hissen Habre	Chad	US$3 million

Source: Amadi & Ekekwe (2014). Please note that Hodess (2004) has estimated that Sani Abacha (Nigeria) and Mobutu Sese Seko (Zaria) have embezzled approximately US$5 billion respectively.

Table 32: Summary of variables, description, and sources

Variable	Description	Definition	Source
Diversification	UNCTAD diversification index	The diversification index indicates whether the structure of exports or imports by product of a given country or country group differs from the world pattern.	UNCTAD, 2016.
Concentration	UNCTAD concentration index	UNCTAD concentration index shows how exports and imports of individual countries or country groups are concentrated on a few products or otherwise distributed in a more homogeneous manner among a series of products.	UNCTAD, 2016.
GDPPER	GDP per capita, PPP (constant 2011 international $)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates.	World Bank, 2016 (World Development Indicators).
Inflation	Inflation, consumer prices (annual %)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	World Bank, 2016 (World Development Indicators).

CA	Current Account balance % of GDP	Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income.	World Bank, 2016 (World Development Indicators); African Development Bank, 2016.
GS	Gross savings (% of GDP)	GS is calculated as gross national income less total consumption, plus net transfers.	World Bank, 2016 (World Development Indicators).
FDI	Foreign Direct Investment % of GDP	Foreign direct investment is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments as a % of GDP.	World Bank, 2016 (World Development Indicators).
LifeExpec	Life expectancy at birth, total (years)	Life expectancy at birth indicates the number of years a new born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Bank, 2016 (World Development Indicators).
CC	Control of Corruption	CC captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption. The rating scale is -2.5 (high corruption) to 2.5 (low corruption).	World Bank, 2016 (Worldwide Governance Indicators).
GE	Government Effectiveness	GE captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The rating scale is -2.5 (low GE) to 2.5 (high GE).	World Bank, 2016 (Worldwide Governance Indicators).
PS	Political Stability and Absence of Violence/Terrorism	PS measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. The rating scale is -2.5 (low PS) to 2.5 (high PS).	World Bank, 2016 (Worldwide Governance Indicators).
RL	Rule of Law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The rating	World Bank, 2016 (Worldwide Governance Indicators).

		scale is -2.5 (low RL) to 2.5 (high RL).	
RQ	Regulatory Quality	RQ captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. The rating scale is -2.5 (low RQ) to 2.5 (high RQ).	World Bank, 2016 (Worldwide Governance Indicators).
GQ	Government Quality	GQ is a composite statistic which encapsulates the above five World Governance Indicators. The rating scale is 0 (low government quality) to 1 (high government quality).	World Bank, 2016. The GQ composite statistic is the author's own calculation based on Worldwide Governance Indicators.

Table 33: Regression model 1 (pooled OLS estimator)

Dependent Variable: DIVERSIFICATION
Method: Panel Least Squares
Date: 02/27/17 Time: 22:54
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	0.158061	0.086876	1.819376	0.0696
INFLATION	1.49E-06	1.73E-05	0.086259	0.9313
CA	0.000164	0.000503	0.326458	0.7443
FDI	-0.000439	0.000638	-0.688693	0.4914
GS	0.001721	0.000337	5.103424	0.0000
LIFEEXPEC	-0.001322	0.000682	-1.938471	0.0533
GQ	-0.644221	0.186013	-3.463310	0.0006
C	0.866678	0.036339	23.84965	0.0000

R-squared	0.140084	Mean dependent var	0.787079
Adjusted R-squared	0.124728	S.D. dependent var	0.078333
S.E. of regression	0.073286	Akaike info criterion	-2.369109
Sum squared resid	2.105343	Schwarz criterion	-2.289280
Log likelihood	481.8218	Hannan-Quinn criter.	-2.337496
F-statistic	9.122639	Durbin-Watson stat	0.223622
Prob(F-statistic)	0.000000		

Table 34: Regression model 1 (FEM estimator)

Dependent Variable: DIVERSIFICATION
Method: Panel Least Squares
Date: 02/27/17 Time: 22:59
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	-0.009856	0.044440	-0.221787	0.8246
INFLATION	-2.49E-06	8.20E-06	-0.303783	0.7615
CA	-0.000276	0.000296	-0.932648	0.3516
FDI	-0.000888	0.000348	-2.548783	0.0112
GS	-0.000315	0.000304	-1.035158	0.3013
LIFEEXPEC	-0.002758	0.000456	-6.050676	0.0000
GQ	0.574172	0.213446	2.690009	0.0075
C	0.909842	0.025810	35.25204	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.835422	Mean dependent var	0.787079
Adjusted R-squared	0.823950	S.D. dependent var	0.078333
S.E. of regression	0.032867	Akaike info criterion	-3.927561
Sum squared resid	0.402937	Schwarz criterion	-3.658138
Log likelihood	812.5123	Hannan-Quinn criter.	-3.820866
F-statistic	72.82337	Durbin-Watson stat	0.958616
Prob(F-statistic)	0.000000		

Table 35: Regression model 2 (pooled OLS estimator)

Dependent Variable: DCONCENTRATION
Method: Panel Least Squares
Date: 02/27/17 Time: 22:28
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	0.101558	0.079084	1.284172	0.1998
INFLATION	5.65E-06	1.57E-05	0.359481	0.7194
CA	-4.67E-05	0.000458	-0.102041	0.9188
FDI	0.000320	0.000580	0.551547	0.5816
GS	6.47E-05	0.000307	0.210859	0.8331
LIFEEXPEC	0.000203	0.000621	0.327471	0.7435
GQ	0.087596	0.169330	0.517311	0.6052
C	-0.024553	0.033080	-0.742245	0.4584

R-squared	0.006801	Mean dependent var	-0.002777
Adjusted R-squared	-0.010934	S.D. dependent var	0.066351
S.E. of regression	0.066713	Akaike info criterion	-2.557047
Sum squared resid	1.744627	Schwarz criterion	-2.477217
Log likelihood	519.4093	Hannan-Quinn criter.	-2.525433
F-statistic	0.383482	Durbin-Watson stat	2.593829
Prob(F-statistic)	0.911939		

Table 36: Regression model 2 (FEM estimator)

Dependent Variable: DCONCENTRATION
Method: Panel Least Squares
Date: 02/27/17 Time: 22:28
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	0.101558	0.079084	1.284172	0.1998
INFLATION	5.65E-06	1.57E-05	0.359481	0.7194
CA	-4.67E-05	0.000458	-0.102041	0.9188
FDI	0.000320	0.000580	0.551547	0.5816
GS	6.47E-05	0.000307	0.210859	0.8331
LIFEEXPEC	0.000203	0.000621	0.327471	0.7435
GQ	0.087596	0.169330	0.517311	0.6052
C	-0.024553	0.033080	-0.742245	0.4584

R-squared	0.006801	Mean dependent var	-0.002777
Adjusted R-squared	-0.010934	S.D. dependent var	0.066351
S.E. of regression	0.066713	Akaike info criterion	-2.557047
Sum squared resid	1.744627	Schwarz criterion	-2.477217
Log likelihood	519.4093	Hannan-Quinn criter.	-2.525433
F-statistic	0.383482	Durbin-Watson stat	2.593829
Prob(F-statistic)	0.911939		

Table 37: Regression model 2 (REM estimator)

Dependent Variable: DCONCENTRATION
Method: Panel EGLS (Cross-section random effects)
Date: 02/27/17 Time: 22:29
Sample (adjusted): 1996 2015
Periods included: 20
Cross-sections included: 20
Total panel (balanced) observations: 400
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLGDPPER	0.101558	0.080321	1.264405	0.2068
INFLATION	5.65E-06	1.60E-05	0.353948	0.7236
CA	-4.67E-05	0.000465	-0.100470	0.9200
FDI	0.000320	0.000589	0.543057	0.5874
GS	6.47E-05	0.000312	0.207613	0.8356
LIFEEXPEC	0.000203	0.000631	0.322430	0.7473
GQ	0.087596	0.171977	0.509349	0.6108
C	-0.024553	0.033597	-0.730820	0.4653

Effects Specification		
	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.067756	1.0000

Weighted Statistics

R-squared	0.006801	Mean dependent var	-0.002777
Adjusted R-squared	-0.010934	S.D. dependent var	0.066351
S.E. of regression	0.066713	Sum squared resid	1.744627
F-statistic	0.383482	Durbin-Watson stat	2.593829
Prob(F-statistic)	0.911939		