NELSON MANDELA UNIVERSITY

THE RELATIONSHIP BETWEEN EXPORT DIVERSIFICATION, EXPORT CONCENTRATION AND ECONOMIC GROWTH

By

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DECLARATION

I, SIBUSISIWE MCHANI, student number 214080838), hereby declare that the treatise/dissertation for MCom Economics (Coursework) to be awarded in my own work and that it is not previously been submitted for assessment or completion of any postgraduate qualification to another university or for another qualification

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ABSTRACT

Export diversification on economic growth has been a controversial issue in the empirical literature for a long time. This study examined the role of export diversification and export concentration on economic growth in the top ten trading countries in Africa and top ten trading countries in the world. The study used annual time series data for the period covering 1995 to 2014 and employed a PMG (Pooled Mean Group) Model to determine the effects of export concentration and export diversification and possible factors that affect it on economic growth. The estimation results attest to a positive effect of export diversification and a negative effect of export concentration on economic growth in the top ten trading countries in the world. However, for the top ten trading countries in Africa, the results show that export diversification is negatively related to economic growth, while export concentration positively affects economic growth. These results hold even when the DOLS and FMOLS are employed establishing their robustness. The study further shows that other control variables such as employment and government spending positively affect economic growth, while human capital and investment negatively affects economic growth in Africa. In the top ten trading countries in the World, government expenditure and investment are significant positive determinants of economic growth. It is recommended that governments in Africa countries should promote export diversification together with government expenditure, and pursue policies that will attract foreign direct investment into growth–enhancing productive sectors of their economies

Keywords: Economic growth, Export concentration, Export diversification, pooled mean group (PMG) estimators, panel causality, African economies, global economies.

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ACRONYMS AND ABBREVIATIONS

GDP	Gross Domestic Product
SARB	South African Reserve Bank
ARDL	Autoregressive Distributed Lag Model
SA	South Africa
PMG	Pooled Mean Group
UNTACD	United Nations Conference on Trade and Development
LDCs	Less-developed countries
WB	World Bank
WTO	World Trade Organisation

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CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

Following a 1993 landmark report by the World Bank (World Bank, 1993) attributing the Asian miracle of the 1990's to the diversified structure of production and trade of goods and services of the Asian Tigers, many academics have advocated for trade diversification as an antidote for low growth and volatility in developing economies (De Pineres and Ferrantino (1997), Al-Marhubi (2000), Lederman and Maloney (2003), Balaguer and Cantavella-Joda (2004), Herzer and Nowak-Lehman (2006), Hausmann and Rodrik (2003), Hausmann et al. (2006), Hesse (2008), Agosin (2009), Murshed and Serino (2011), Hamed et al. (2014), Hodey et al. (2015), Matthee et al. (2016), McIntyre et al. (2018), Blancheton and Chhorn (2019), Lee and Zhang (2019)). The main argument is that less developed economies tend to concentrate their export baskets on 'traditional products', such as agricultural and mineral exports, which constitute an overwhelming majority of their trade portfolios and lessons to be learnt from the Asian miracle is for these less developed countries to diversify their export products into manufacturing and other hi-tech based commodities.

Over the last couple of decades, the African continent has made great strides in improving economic growth rates despite such developments being interrupted by the global financial crisis (GFC) of 2007-2009. Even though the GFC itself did not exert severe contagion effects on African financial markets as it did in financial markets in other industrialized economies, it was the ensuing global recessionary period of 2009-2010 which took a toll on African trade markets. Many academics argue that the diversification of exports would have cushioned the negative externalities of shocks, such as those presented by the GFC, since the 'widening' of the export basket would make trade earnings in foreign currencies less volatile (Herzer and Nowak-Lehman (2006) and Hesse (2008)). Moreover, replicating the trade structures of more developed countries by export diversification generates new production technologies and managerial efficiencies through international competition. This, in turn, weakens the

long-term dependence of less developed countries on industrialized markets for manufactures and other high-technological products (Hodey et al., 2015). However, African countries are currently ranked as the least diversified economies globally and are being encouraged by international bodies such as the International Monetary Fund (IMF), the World Bank (WB) and the World Trade Organization (WTO) to pursue export diversification policies, with the recently signed African Free Trade Agreement in 2019 further places emphasis on trade diversification within intra-trade dimensions (Osakwe et al., 2018).

In our study, we contrast the effect of export diversification and export concentration on economic growth between the top 10 trading African economies and the top 10 global trading countries. We use the World Trade Organization's (WTO) 'World Trade Statistical Review' to determine the top African and global trading economies, according to their share in merchandise trade of WTO members. The main export baskets for these two groups of economies alongside their GDP value in US dollars (PPP) and GDP growth rates are summarized in Table 1.1. As can be observed, the top trading African countries mainly depend on agricultural and mineral products whereas their global counterparts are primarily focused on manufacturing and technological products. Moreover, the GDP dollar value is higher in the top trading countries whereas GDP growth rates are generally higher in African economies. Given the observed differences in export structures and GDP in both samples, our study seeks to clarify whether the 'export diversification – improved growth' phenomenon is indeed a universal tenant or whether there are disparities in this relationship between African countries and more advanced economies.

Table 1.1: Comparison of main trade baskets and GDP between top African and top global traders

Top 10 trading economies globally				Top 10 African trading economies		
Country	Product	GDP (2018)		Country	Product	GDP (2018)

USA	Computers and electrical machinery, vehicles, chemical products, food and live animals, military equipment and aircraft	$20.54 trillion [2.9%]		Algeria	Oil, gas.	$653.77 billion [1.4%]
China	Manufactured goods, including textiles garments electronics, arms.	$25.39 Trillion [3.0]		Angola	Oil, diamonds, minerals, coffee, fish, timber.	$198.79 billion [-2.1%]
Italy	Machinery, Vehicles, Electrical, Pharmaceuticals, Plastics, Mineral fuels, Iron, steel	$2.53 Trillion [0.8]		Cote d'Ivoire	Cocoa, coffee, tropical woods, petroleum, cotton, bananas, pineapples, palm oil, fish.	$105.47 billion [7.4%]
Germany	Machinery, Vehicles, Pharmaceuticals, Medical apparatus, plastics, Aircrafts, mineral fuels, Iron, steel.	$4.40 Trillion [1.5%]		Egypt	Petroleum, petroleum products and cotton.	$1.22 trillion [5.3%]
Netherlands	Machinery, Mineral fuels, Electrical machinery and equipment, Pharmaceuticals, medical apparatus, vehicles, plastics, organic chemicals.	$970.60 billion [2.6%]		Ghana	Gold, cocoa, timber, tuna, bauxite, aluminium, manganese ore, diamonds.	$141.29 billion [6.3%]
Japan	Vehicles, computer parts, chemicals, scientific instruments and watches.	$5.42 Trillion [0.8%]		Morocco	Minerals, seafood products, citrus fruit.	$315.16 billion [3.0%]
France	Machinery,	$3.04		Nigeria	Petroleum,	$1.17

	Vehicles, Mineral fuels, Electrical machinery and equipment, plastics, Pharmaceuticals, Aircrafts.	Trillion [1.7%]			Petroleum products, cocoa, rubber.	trillion [1.9%]
Korea	Electronic products, machinery and transport equipment.	$2.07 Trillion [2.7%]		South Africa	Gold, diamonds, metals and minerals, cars, machinery.	$790.82 billion [0.8%]
United Kingdom	Machinery, Vehicles, Precious metals, mineral oils, Pharmaceuticals, Electrical machinery and equipment.	$3.05 Trillion [1.4%]		Tunisia	Agriculture products, textiles, Oil	$144.59 billion [2.5%]
Canada	Machinery and equipment, automotive products, metals and plastics, forestry products, agricultural and fishing products, energy products.	$1.78 Trillion [1.9%]		Democratic of Congo	Diamonds, Copper, Coffee, Cobalt, Crude Oil	$78.37 billion [5.8%]

Notes: Compiled using World Bank data. GDP growth rates for 2018 reported in [].

In conducting our research, we make two noteworthy contributions to the academic paradigm. Firstly, there is very little empirical literature exclusively examining the impact of export diversification-concentration on economic growth exclusively for African countries, with the works of Tesfay et al. (2014) for Ethiopia, Mudenda et al. (2014) for South Africa and Matthee et al. (2016) for South Africa and Lofti and Karim (2017) for Morocco and Duru and Ehidiamhen (2018) for Nigeria, serving as sole exceptions for individual African countries. However, apart from evidence the evidence for these individual African countries, the literature is wanting for studies on the African continent. Secondly, our study addresses the issue of causality between export diversification-concentration and economic growth which, to the best of our knowledge, has not being

previously investigate in the literature. This is an important avenue to explore since the current empirical literature pre-assumes causality running from export diversification-concentration to economic growth whilst ruling out the possibility of economic growth causing diversification-concentration of exports. Evidence of reverse causality is plausible as it emphasizes the role of economic development in facilitating export diversification as put forward by Imbs and Wacziarg (2003) and Klinger and Lederman (2006).

1.2 PROBLEM STATEMENT

Most countries like Sub–Saharan Africa countries are associated with the problem of low and volatile growth in the face of high incidence of poverty over the years. The idea has been that export diversification can lead to higher growth. But this claim over the years has largely remained theoretical since empirical literature explaining the amount of growth that could be induced by export diversification is sparse.

Now, some countries like Canada and Nigeria are more dependent on exports to a single market than at any point in their history. The obvious policy question that arises is whether this is a problem. Part of the static welfare gains in standard neoclassical trade models is derived from specialization in production and trade flows. These gains can be offset by the increased risk associated with increased specialization. For example, Wegner (2004) observed that the economies of Africa still lack the necessary “shock absorbers” to withstand internal and external shocks. The point may therefore be advanced that Africa’s efforts at climbing the economic heights have partly been crippled by high dependence on a few primary export commodities. In Africa, apart from a few primary commodities and tropical products, all other products are in net import status, and this situation is likely to continue over the next decade unless industrialization and intraregional trade in the continent are intensified (Verter, 2018).

In modern international competition, a country cannot solely depend on primary commodities for trade; however, a country needs to diversify its composition of exports to remain competitive. Diversification into other sectors, especially those more intensive in technology, is prone to trigger knowledge spillovers from the exposure to international

markets, management and marketing practices as well as production processes (Choga, 2014).The debate centres on whether or not countries should promote export concentration or export diversification to obtain economic growth and whether such a relationship is different between African countries and industrialized economies.

1.3 AIMS AND OBJECTIVES OF THE STUDY

The main objective of the study was to determine the possible relationship between export diversification and economic growth, on one hand, and between export concentration and economic growth, on the other hand. The specific objectives are:

- To empirically examine the relationship between export concentration and economic growth in the top 10 African trading countries and top 10 industrialized trading economies.
- To empirically examine the relationship between export diversification and economic growth in the top 10 African trading countries and top 10 industrialized trading economies.
- To determine the strength and causal direction of the relationship between export concentration and economic growth in the top 10 African trading countries.
- To determine the strength and causal direction of the relationship between export concentration and economic growth in the top 10 industrialized trading countries.

1.4 RESEARCH HYPOTHESIS

The study constructs four sets of research hypotheses. The first set of hypotheses is:

- H_0: Export concentration negatively influences economic growth
- H_1: Export concentration positively influences economic growth

The second set of hypotheses is:

- H_0: Export diversification negatively influences economic growth
- H_1: Export diversification positively influences economic growth

The third set of hypotheses is:

- H_0: Export concentration granger causes economic growth
- H_1: Economic growth granger causes export concentration

The fourth set of hypotheses is:

- H_0: Export diversification granger causes economic growth
- H_1: Economic growth granger causes export diversification

1.5 RESEARCH METHODOLOGY

To attain the objectives set in the study, I use two primary econometric models. The first is the Pooled Mean Group (PMG) model of Pesaran and Shin (1999). The second is the panel granger causality test of Demitrescu and Hurlin (2012).

1.6 SIGNIFICANCE OF THE STUDY

The globalisation of the world economy and the common view that increasing exports has benefits for society has encouraged research into the field of exports (Liargovas and Skandalis, 2008). Though there are some suggested effects of export diversification and concentration on economic growth and competitiveness, there is no clear-cut answer as to the existence and type of relationship between these variables. This study sought to answer the questions that arise on the specific relationship between export diversification and concentration and economic growth, and the role it plays in the competitiveness of trading countries in international market. The study helps to determine the role that has been played by export concentration and diversification on economic growth and development in the twenty trading countries (top ten trading countries globally and top ten trading countries in Africa). Since exports act as an engine of growth such an analysis of the impact of export diversification and concentration on economic growth can be useful to policy makers in designing strategies for the export promotion policies in the countries. By focusing on twenty countries, this study contributes towards understanding the export dynamics of different countries.

1.7 ORGANISATION OF THE STUDY

The study is organized into five chapters.

- **Chapter one** is an introduction to the study. It provides the context within which the study is examined, the problem statement, the outlined objectives of the study, and significance of the study.
- **Chapter Two** contains a review of literature on the concepts, theories, and debates underpinning the study and appropriate in guiding the study.
- **Chapter Three** provides the methodology, methods, and tools used for data analysis.
- **Chapter Four** contains data presentation and analysis of findings
- **Chapter Five** provides summary of findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

The relationship between export concentration, export diversification and economic growth has been discussed by many researchers. Most international trade theories portray a positive relationship between the volume of trade and economic growth, right from classical comparative advantage model of David Ricardo, the neoclassical model of Heckscher and Ohlin, to the contemporary endogenous growth models. In other words, if a country can trade at any price ratio other than its domestic price, it will be better off. Although the various models assume that different factors cause the trade, but the end result portrays improvement in the output and welfare.

This chapter seeks to provide more insight on the relationship between export concentration, export diversification and economic growth by firstly providing a theoretical framework which will delve deeper on what is export concentration and diversification and the relationship of trade to economic growth based on economic theory. The theoretical framework will also look at the trade theories which are; the Ricardian model as developed by Ricardo (1817), the theory of relative differences in factor endowments (Hecksher (1919) and Ohlin, (1933) the Presbisch-Singer Hypothesis and the growth theories, neoclassical growth (Solow) model and endogenous growth model. The empirical section explores studies that have been conducted by different authors in different countries (developing and developed countries) and global studies regarding the relationship between export concentration, export diversification and economic growth. The empirical section allows us to analyse, critique and explain methodologies, results from researchers and come up with grounded conclusions and policy recommendations. This chapter is divided into three sections. Section 2.2 covers the theoretical literature, Section 2.3 discusses empirical literature and Section 2.4 concludes the chapter.

2.2. THEORETICAL LITERATURE REVIEW

In general, international trade theories predict that once countries open up to trade outside their borders they will specialize in goods for which they have comparative advantage. Early theories of trade explained comparative advantage as being driven by relative productivity differences (as explained by David Ricardo) or by relative abundance of factors of production (as explained by Eli Heckscher and Bertil Ohlin). More recent theories incorporate monopolistic competition and firm level analysis in their models to allow countries (or firms within a country) to specialize in varieties of goods in order to explain what economists refer to as intra-industry trade when two countries trade among themselves products within the same industry, such as cars, for example (Helpman and Krugman 1985, Melitz 2003).

2.2.1. The Ricardian Model: Specialization from technological differences

A model of comparative advantage that relies on differences of labour productivity was first introduced in the early nineteenth century by an economist named David Ricardo, and therefore it is also referred to as the Ricardian Model. Ricardo argues that countries gain in the international market by specialising in the production of products in which they have a comparative advantage and thereby increase total productivity (Ukwandu, 2015). So to achieve economic growth by means of Ricardo's conception, a country should promote a sector in which it has a comparative advantage. It is widely held that each country has a comparative advantage in producing something, in exporting certain products, and that specialization in those export lines will generate "gains from trade". The Ricardian model shows the possibility that an industry in a developed country could compete against an industry in a less-developed country (LDC) even though the LDC industry pays its workers much lower wages (Suranovic, 2003). The Ricardian model particularly explains why it can be beneficial for two countries to trade if one country has a lower relative cost of producing some goods. The comparative advantage theory further asserts that unrestricted exchange between countries will increase the total amount of world output if each country tends to specialise in those goods that it can produce at a relatively lower cost compared to potential trading partners (Cypher and

Dietz, 2004). In a Ricardian world, trade is determined by relative efficiency in production.

2.2.2. The Heckscher-Ohlin Model: Specialization from differences in endowments: Factor Proportion Theory

Shortcomings of the Ricardian model led to the development of the Heckscher-Ohlin (H-O) theory which is more sophisticated than the Ricardian theory. In reality, in the real world, trade is not just determined by technological differences, but it also reflects differences in resources endowments across countries. The Hecksher-Ohlin (H-O) theory acknowledges that differences in the abundance of factor endowments and differences in factor intensities of commodities give rise to differences in autarky commodity prices. In other words, the Heckscher-Ohlin theorem states that countries export those commodities which require relatively intensive use of those productive factors found locally in relative abundance (Bjornskov, 2015). Therefore, for example, Canada exports forestry products to the United States not because its workers are more efficient in forestry, but because Canada is more endowed with forests. To explain the importance of resources in trade two economists, Heckscher and Ohlin, have developed a theory where trade is determined by the interaction between the relative abundance of factors of production (such as capital, labour or land) and the relative intensity with which these factors of production are used in the production of different goods. Since in this theory, comparative advantages are determined by the proportion of factors endowments and the proportion in which these factors are used in the production of goods, the theory is known as the "factor proportion theory". The Heckscher Ohlin theorem states that countries which are rich in labour will export labour intensive goods and countries which are rich in capital will export capital intensive goods (Wilkerson, 2018)

In summary, the Heckscher-Ohlin argues that if two countries want to enter into trade with each other they must have the same technology, constant returns to scale, and a given factor-intensity relationship between final products. The country with better factor

endowment should produce goods at a larger scale and trading will boast economic growth (Heckscher, 1919 & Ohlin, 1933).

Nevertheless, the Ricardian and the Hecksher-Ohlin models provide no clear role for export diversification. Underlying both models is the idea of specialization according to comparative advantage, rather than diversification. The Ricardian approach emphasizes technological or productivity differences between countries and shows that countries can gain by specializing in and exporting goods in which they have a relative cost advantage. The Hecksher-Ohlin model focuses on the relative proportion between productive factors (i.e., physical capital, labour, land, skills or human capital). Hence, poor countries specialize in export of goods intensive in unskilled labour and land, whereas richer countries specialize in export of goods intensive in human and physical capital.

2.2.3. Prebisch-Singer Hypothesis

The debate among Development Economists as to whether developing countries should specialize in the production and export of primary commodities has long persisted. A theoretical argument for a connection between export diversification and economic growth was originally advanced in the 1950s by Raul Prebisch and Hans Singer. The seminal work of Prebisch (1950) in Latin America in connection with this debate is a major addition to the literature. Contrary to the long-held view by the Classical Economists that terms of trade for primary-product exporting countries is likely to improve if they specialize, The Prebisch-Singer hypothesis states that primary commodity prices relative to manufactures present a downward trend (Arezki, Hadri and Rao, 2014). Prebisch and Singer observe that exports from developing countries are dominated by primary products; whilst imports are dominated by manufactured goods. Many developing countries including South Africa are still reliant on a small number of primary commodities to generate the majority of their export earnings. However, it is argued this level of dependency have implications on the behaviour of prices. (Adoma, 2016). Prebisch and Singer (1950), argue that over concentration in primary commodities for export combined with a relatively slow rate of technical progress is the

cause of ever-worsening structural imbalances in developing economies. In other words, Prebisch and Singer (1950) believed that the long term trend of primary commodity price was negative. Countries that export primary goods that do not have the means to manufacture goods to export will lose in the long run as their goods will become relatively cheaper than the manufactured ones. A common explanation for the phenomenon is the observation that the income elasticity of demand for manufactured goods is greater than that for primary products. Therefore, as income rise, the demand for manufactured goods increases more rapidly than demand for primary products (Choga, 2014).

According to Adoma (2016), like any other hypothesis, the Prebisch-Singer hypothesis can be subjected to criticisms. The Prebisch-Singer hypothesis has lost relevance as exports of simple manufactures have overtaken exports of primary commodities in most developing countries especially in the Asian countries as well as South Africa. Therefore, much of the recent research inspired by the Singer and Prebisch hypothesis focuses on less relative prices of primary products and manufactured goods and more on the relative prices of simple manufactures produced by developing countries and complex manufactures produced by developed countries.

2.2.4. Neoclassical growth theory in the Solow tradition

The model was developed by Solow (1956) in the 1950s and further elaborated till the 1970s. The Neoclassical (Solow) Model is the most widely known growth model and explains growth as the result of capital accumulation, labour and technological progress. Production is described by a simple Cobb-Douglas production function.

Solow suggested that GDP per worker is positively related to a higher share of GDP devoted to investment. In other words, more investment today was believed to be associated with higher growth in the future. In this model growth is believed to be negatively related to the rate at which physical stock depreciates. A higher rate of depreciation of physical leads to a decrease in growth. More so, a faster labour force growth rate also leads to a decrease in the growth of GDP per worker. However an

increase in the rate at which technology or total factor productivity grows at, lead to an increase in the growth of GDP per worker.

The neoclassical model states that in the long term, the growth rate of output per worker is dependent on the rate of labour-augmenting improvement in technology, which is determined by factor(s) not contained in the model (also known as exogenous factors) (Rene, 2003). The model implies that all economies that use similar technology, which could improve over time, should have converging productivity growth rates (Solow 1991).

The Solow model can also be used to analyse the impact of trade on economic growth. This can be done using what is called Baldwin's application of the Solow model. Baldwin (1992), showed that within the framework of the Solow growth model an improvement in welfare from a shift from restricted trade to free trade results in a secondary improvement in real output. A shift to free trade effectively improves the economy's efficiency with which it transforms its available inputs into welfare-enhancing final products. That is, free trade effectively shifts the production function in the Solow model, and thus generates economic growth while the shifts to higher level of capital and output. Baldwin' model does not take into account whether the country is exporting capital goods and importing consumer goods therefore the model underwent severe criticisms by Mazumdar (1996). Mazumdar (1996) pointed out that a country may not be able to increase its rate of growth if it exports capital goods and imports consumer goods. Mazumdar's analysis concludes that growth will increase if a country imports capital goods and exports consumer because capital good are capital intensive (Choga, 2014).

2.2.5. Endogenous growth model

The inability of the neoclassical theory to account for the variations in national income between developing and developed countries led to the growth of the endogenous growth theory. The endogenous growth model was developed from the works of Harrod (1939), Domar (1946), Frankel (1962), Romer (1986) and Lucas (l988). Moreover,

endogenous growth theories place special emphasis on trade as the principal channel that allows knowledge to be transmitted internationally (Grossman and Helpman 1991).

The literature on endogenous growth theory highlights the importance of the nature of the sector in which a country specializes, as the returns to scale depend on the sector itself. The theory views diversification of exports from primary commodities into high skilled, high technology goods desirable because trade in these products allows for more scope for growth through productivity gains than traditional commodity exports. There are more opportunities for spillover effects in manufactured trade than in primary commodity trade. Spillover effects are due to skills and technological upgrading which have more positive externalities than in primary commodity production (Naude and Rossouw, 2008). In addition, the endogenous growth model also emphasizes the role of increasing returns to scale. Improved production techniques associated with export diversification are likely to benefit other industries through knowledge spillovers. The knowledge externalities include productivity enhancement resulting from increased competitiveness, more efficient management styles, better forms of organization, knowledge about technology and international markets. In conclusion, the argument derived from the endogenous growth models is based on the fact that export diversification is beneficial not only for offsetting export earning fluctuations, but it has also a very strong and dynamic comparative advantage. (Choga, 2014)

Notwithstanding the various arguments and the theoretical explanations forwarded for the channel through which export diversification translates into growth, the evidence as to whether export diversification impacts growth for countries and regions of the world remains an empirical issue. The next section provides a review of the recent and relevant empirical literature available on the diversification–growth nexus.

2.3. EMPIRICAL LITERATURE REVIEW

The literature over the years seeks to establish a link between export concentration, export diversification and economic growth through cross–country, regional, country–level studies. Some of these studies focused on diversification and the others on specialization. There is much ambiguity surrounding the relationship between export

concentration, export diversification and economic growth. The findings of the available studies are however mixed as some find a monotonic relationship between export diversification and economic growth while others find a non–monotonic relationship. Even with those that find a monotonic relationship, there seems to be ambiguity regarding the effect of export diversification on growth; as some find a positive effect.

Generally, an investigation of the available empirical literature shows that whilst some studies indicate a positive monotonic relationship between export diversification and economic growth (Al-Marhubi, 2000; Agosin 2007; Lederman and Maloney, 2007; Herzer and Nowak-Lehman, 2006; Lugeiyamu (2016)), others reveal a non–monotonic (hump–shaped) relationship between export diversification and economic growth (Aditya and Roy, 2007; Imbs and Wacziarg, 2003; Hesse, 2008; Lederman and Klinger, 2006;). These studies largely use datasets for different time periods and regions across different methodologies. This study contributes to the literature by investigating this relationship in the context of top ten trading countries in the world and top ten countries in Africa since the functional relationship between export diversification and growth matters for policy.

Despite the different approaches, most of the studies confirmed a positive relationship between export diversification and economic growth (Ouoba , 2017; Saboori, Sulaiman and Mohd (2012; Arip, Lau and Karim 2010; Esteve and Tamarit, 2012; Hamit-Haggar, 2012; Chow, 2014; Hodey,2013; Mudenda, Choga and Chigamba; Lofti and Karim ,2017; Duru and Ehidiamhen ,2018; Wudie,2015; Chandra, Boccardo and Osorio ,2007; Tesfay 2016; Rondeau and Roudau 2015), suggesting that a greater stage of export diversification would lead to higher level of economic growth and development and that countries should have to diversify its export commodities where it has comparative advantage. This is in line with endogenous growth model which appreciates the fact that the degree of goods diversification and increases in export diversification has a positive effect on the country's human capital accumulation (Mayer, 1996). In other words the more a country's basket of exports is diversified the higher the rate of human accumulation, leading to higher productivity and hence increased

economic growth. However Rondeau and Roudau (2015) found that a positive effect of diversification tends to decrease with the level of GDP per capita.

On the contrary, some studies conducted reject the idea of the possible beneficial effects that export diversification could have upon economic growth. Among the opponents, Love's (1983) position is important to be taken into account. In his work, he states that moving from primary products into manufactures should not be always considered as the best developmental strategy for developing economies. Some characteristics, like recurring shortages of raw materials, capital equipment, spare parts and skilled labour, would seriously limit the capacity of many developing countries to efficiently produce manufactures. (Mejia, 2011). Together with that, Love refers to empirical evidence establishing that some manufactured goods actually experience more volatility and price variations than some "traditional" exports. In some cases, "increased shares of non-traditional exports have been accompanied by relatively greater increases in their instability. (Love, 1983).

Looking at export concentration, most studies have found export concentration to have a negative effect on economic growth. This result meets a-priori expectations as reported in the literature review. Hesse (2008) using Ordinary least squares, panel data technique found that high levels of export concentration were detrimental to growth per capita especially for developing countries. Matadeen (2011) has found an inverse relationship between export concentration and economic growth, meaning that when export concentration increases economic growth decreases vice versa. This coincides with a study by Perersson (2005), who argues that reduced export concentration led to positive an terms of trade and increases in economic growth. Furthermore, the results by Misztal (2011) show that the relationship between the degree of exports concentration and GDP per capita took the shape of the letter "W". It meant that the exports diversification increased in countries with relatively low GDP per capita, while the exports concentration increased in countries with relatively high GDP per capita.

On the other hand, a U shape relationship was found by Imbs and Wacziarg (2003) when examining the relationship between domestic concentration and per capita

income. Countries diversify initially and then specialize as income increases. Cabellero and Cowan (2006) and Klinger and Lederman (2006) show that this relationship also holds for a countries' export. Lederman and Maloney (2003) while examining the relationship between trade structure and econometric growth found that countries which have a lot of natural resources grow more slowly because of export concentration rather than dependence on natural resources per se.

Needless to say, the debate on export diversification, export concentration and economic growth is still ongoing. A summary of empirical studies discussed above are provided in Table 2.1 below.

Table 2.1: Summary of selected empirical literature on export diversification, export concentrations and economic growth

Author	Case study	Countries	Study period	Model	Key findings
Arip, Lau and Karim (2010)	Export diversification and economic growth in Malaysia.	Malaysia	1980 - 2007	VECM	The study found that export diversification played an important role in increasing economic growth
Agosin (2007)	Export diversification and growth in emerging economies	Korea, Taiwan, Mauritius, Finland, China, and Chile	1980 – 2003		The paper show that export diversification is indeed associated with higher economic growth.

Matadeen (2011)	Export diversification and economic growth. Case Study of a Developing Country Mauritius	Mauritus	1980-2088	VECM	An inverse relationship is found between the export concentration and the economic growth variables.
Lofti and Karim (2017)	Export Diversification and Economic Growth in Morocco: An Econometric Analysis	Morocco	1980-2015	VAR	Suggests that greater stage of export diversification would lead to a higher level of economic development.
Mudenda, Choga and Chigamba (2014)	The Role of Export Diversification on Economic Growth in South Africa	South Africa	1980-2015	VECM	export diversification and trade openness are positively related to economic growth
Hodey (2013)	Export diversification and economic growth in Sub–Saharan	Sub–Saharan Africa	1995-2010	GMM	Results attest to a positive effect of export diversification on economic growth

	Africa				
Duru and Ehidiamhen (2018)	Empirical Investigation of the Impact of Export Diversification on Economic Growth: Evidence from Nigeria	Nigeria	1980-2016	ARDL	Results showed that export diversification had a positive and insignificant relationship with economic growth in Nigeria
Wudie (2015)	Relationship between export diversification and economic growth in Ethiopia	Ethiopia	1970/71 – 2013/14	OLS	Positive link was found to exist between export diversification and economic growth in Ethiopia.
Herzer and Lehnmann. (2006)	What does export diversification do for growth? An econometric analysis	Chile	1960-2001	DOLS	Results suggest that export diversification plays an important role in economic growth.
Ferreira	The expansion and	Costa Rica	1965 -	Cointegration	The study found that export diversification had no long

(2009)	diversification of the export sector and economic growth: the Costa Rican experience		2006	and DOLS Model,	run effect on economic growth during the period 1965 to 2006.
Hesse (2008)	Export diversification and economic growth	99 countries Eastern European and oil-exporting countries being excluded	1961-2000	Dynamic panel growth models based on the GMM estimator	High levels of export concentration were detrimental to growth per capita especially for developing countries
Aditya and Roy	Export Diversification and Economic Growth: *Evidence from Cross-Country Analysis*	Sixty five countries	1965-2005	GMM	Export diversification and composition are important determinants of economic growth
Nicet-Chenaf and Rougier (2008)	FDI, export diversification on growth for MENA countries	MENA countries	1995-2009	GMM	The study found that there is a positive impact of export diversification on economic growth

Misztal (2011)	Export diversification and economic growth In European Union member states	European Union	1995 - 2009	VAR	Exports diversification increased in countries with relatively low GDP per capita, while the exports concentration increased in countries with relatively high GDP per capita
Kadyrova (2011)	Export effects of diversification and country growth	88 Countries	1962-2009	GMM	Positive impact of export diversification on countries' income per capita growth.Economies with lower export concentration had a tendency of growing faster
Munir and Javed (2018)	Export composition and economic growth: evidence from South Asian countries	Banglades h, India, Pakistan and Sri Lanka	1990-2013	Fixed effect model	An increase in export diversification lead to higher economic growth initially, however, after the threshold level, export specialization have positive impact on economic growth
Al-Marhubi (2000)	Export Diversification and Growth: An Empirical Investigation	99 countries		OLS	There is an economically large relationship between export diversification and economic growth.

2.4. GENERAL ASSESSMENT OF LITERATURE

Ricardo's and the H-O theory which are based on the static comparative advantage assumptions explain the forces behind international Trade. Ricardo argues that, exports allow for specialization in a country's comparative advantage and thereby making significant contribution to growth (Ricardo, 1817). It is widely held that each country has a comparative advantage in producing something, in exporting certain products, and that specialization in those export lines will generate "gains from trade". Under the traditional comparative advantage theory, what essentially counts is how good a country is at producing one good compared with another good (Samen, 2010).Due to the limitations of the Ricardian comparative advantage, the H-O theory is regarded as more sophisticated because it considered capital as a factor of production. However, the H-O theory has its own short-comings in the sense that it assumed that production is characterized by constant returns to scale and that perfect competition exists in both countries. In reality, markets are imperfect and industries experience increasing returns to scale. Heckscher and Ohlin (HO) focused on relative resource or factor abundance to explain trade, exports, and its evolution. Underlying both models is the idea of specialization according to comparative advantage, rather than diversification.

The diversification theory, Pribisch Singer hypothesis suggests that diversifying into manufactured exports reduce export instability and come with a lot of positive externalities such as knowledge and skills. In addition to trade theories, growth models were also reviewed. Solow (1956) assumed exogenous technological change and results from his study were that growth is explained by capital accumulation and technological progress

An extensive literature review on the relationship between export diversification and economic growth is found mostly in developed countries. The empirical literature provides support that export diversification can be positively associated with economic growth. The empirical literature reviewed in this chapter did not take into account the use of other methodologies such as PMG. This study contributes to the literature by specifically identifying challenges of both export diversification and export concentration at a complete departure from existing literature. The study also contributes to the

literature by making a comparative analysis between top ten trading countries in the world and top ten trading countries in Africa, since the functional relationship between export diversification/concentration and growth matters for policy in both developing and industrialized economies.

2.5. CONCLUSION

The main objective of this chapter was to trace both theoretical underpinnings and empirical evidence that link export diversification, export concentration and economic growth. Both theory and empirical literature generally point out that high levels of export diversification are a favourable condition for positive growth of countries though some theories disagree to this argument. The Prebisch-Singer hypothesis suggests a positive relationship between export diversification and economic growth. The endogenous growth model also argues that there is a positive relationship between export diversification and economic growth. The model suggests that diversifying into manufactured exports reduce export instability and come with a lot of positive externalities such as knowledge and skills. On contrast, the Heckscher-Ohlin trade theory is of the notion that countries should specialise in the production and exportation of products in which they have a comparative advantage in, based on the relative factor availability in each country. In other words, the Heckscher-Ohlin theory suggests a negative relationship between export diversification and economic growth.

The empirical literature largely points toward a positive relationship between export diversification and economic growth and a negative relationship between export concentration and economic growth. However, there are some studies that fail to find any significant relationship between export diversification and economic growth (see Nicet-Chenaf and Rougier (2008) and Aditya and Roy (2009)). These authors argue that too much export diversification may be detrimental to economic growth. The differences in findings are attributed to different econometric modelling techniques, variables specification, countries included in the studies, and the different timeframes adopted for the studies. The next chapter of the study provides a discussion of the methodology that

would be employed in determining the relationship between export diversification and economic growth.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The chapter outlines the methodology of the study. According to (Ethride2004), research methodology is an account of the overall research, research design, research methods, data collection and the statistical analysis that will be carried throughout the study. The objectives of this chapter are to develop a model, specify the relationship between economic growth and export diversification and export concentration, and to discuss the research methods to be utilized for estimating the model, amongst other things. The study utilises the PMG model developed by Pesaran, Shin and Smith (1999). This technique involves pooling and averaging of individual estimates across groups whereby the intercept and short-run slope coefficients and the error variance are assumed to differ across units while the long-run coefficients are constrained to be similar across groups. The study further tests to establish the efficiency of the model using standard diagnostics.

This chapter has ten sections. Section 3.2 presents the description of variables. Section 3.3 present the data sources used in this study. 3.4 present the theoretical framework build from the model on exports concentration and diversification and economic growth used in the study. Section 3.5 specifies the model used in this study. Section 3.6 to 3.9 specifies the estimating techniques used in the study. The estimating techniques deals with unit root tests (Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) tests), cointegration analysis and granger causality test. The last section, section 3.10 concludes the chapter.

3.2 SOURCES OF DATA

The focus for the study shall be on the top 10 trading countries in the world and top 10 trading countries in Africa. Only secondary data will be used in this study. The data for employment, government expenditure, human capital and investment is obtained from

Penn World data, and the data for export diversification and export concentration is obtained from UNCTACD. The scope of the study is from 1995 to 2014.

3.3 DESCRIPTION OF VARIABLES

Economic theory and existing empirical studies inform the choice of the explanatory variables for the study. The study includes the following explanatory variables which are considered as essential for economic growth. The variables are: GDP, Human Capital, government expenditure, employment, investment, Export Diversification and Export Concentration. The description for these variables is given in the table below.

Table 3.1: Description of variables

Variable	Description
Export Concentration	Product concentration index of exports and imports. Annual
Export Diversification	Product diversification index of exports and imports, annual.
Employment	Number of people engaged
Government expenditure	Share of government consumption at current PPPs
Human Capital	Human capital index, based on years of schooling and returns to education
Investment	Share of gross capital formation at current PPPs
GDP	Gross value added by all resident producers in the economy

3.3.1 Measures of Export Concentration and export diversification

3.3.3.1 Export concentration index

A normalized Herfindahl-Hirschmann index of the product concentration of merchandise exports at the country level is used to estimate export diversification and is given by

$$H_j = \frac{\sqrt{\sum_{i=1}^{N}(\frac{X_{i,j}}{X_j})^2} - \sqrt{\frac{1}{N}}}{1-\sqrt{\frac{1}{N}}} \quad (3.1)$$

where $H_j$is the product concentration index of exports for country j, $X_{i,j}$ is the value of exports of product i by country j, $X_j$is the total value of exports of country j, and N is the number of products exported at the three-digit level of the SITC Revision 3. This index ranges from zero to one, with a larger value denoting a higher concentration of exports

3.3.3.2 Export diversification index

The export diversification (DX) index for a country is defined as

$$DX_j = \frac{\sum h_{ij} - x_j}{2} \quad (3.2)$$

Where h_{ij} is the share of commodity i in the total exports of country j and h_j is the share of the commodity in world exports.

3.4 EMPIRICAL FRAMEWORK

The theoretical foundation for this model specification is provided by the endogenous growth models for economic growth. We begin by specifying the following aggregated production function:

$$Y=f(K,H,L) \quad (3.3)$$

Y denotes the output level, K is the amount of physical capital, H is human capital and L denotes labour. We then augment the above production function by including

government size (i.e. G) and exports of goods and services (i.e. E) as endogenous factors of economic growth.

Y=f(K,H,L,E) (3.4)

From equation (4), exports can either be export diversification or export concentration. Assuming that the production function will take a linear form, the general form of the model estimated in this paper has the following form:

$$Y = \alpha_1 + \beta_1 K_1 + \beta_2 H_2 + \beta_3 L_3 + \beta_4 G_4 + \beta_5 E_5 + \varepsilon_t \quad (3.5)$$

Where t captures the time dimension of 1980-2016 and ε_t is the error term.

3.5 MODEL SPECIFICATION

The main objective of this study is testing the cointegration and causal relationship between GDP and export diversification and concentration. From the dynamic equation (5) and following Hesse (2008); Al–Marhubi (2000); and with few modifications based on the description of the variables in Section 3.2, the model to be estimated is therefore written as the following dynamic specification:

$$InGDP = a_1 + \beta_1 GDP_{t-1} + \beta_2 ED_t + \ {}_2EMPL_t + E\ \ GOV_t + \ \ INV_t + L\ \ HUM_t + \varepsilon_t \quad (3.6)$$

$$InGDP = a_1 + \beta_1 GDP_{t-1} + \beta_2 EC_t + \beta_2 EMPL_t + \beta_3 GOV_t + \beta_4 INV_t + \beta_5 HUM_t + \varepsilon_t \quad (3.7)$$

Where: GDP is gross domestic product, EC is export concentration, ED is export diversification, IMPL is employment, GOV is government expenditure, INV is investment, and HUM is human capital and ε_t is the error term.

3.6 PMG REGRESSIONS

The Pool Mean Group, was applied in order to detect the long and short run association between export diversification, export concentration and economic growth, and also investigate the possibly heterogeneous dynamic issue across countries. The estimation technique selected is that proposed by Pesaran et al (1999), Eq. (6 and 7) can be seen as an autoregressive model with a delay in instalments (ARDL) of the form:

$$y_{it} = \sum_{j=1}^{m} \lambda_{ij} y_{it-j} + \sum_{j=0}^{n} \delta_{ij} x_{it-j} + \mu_i + \varepsilon_{it} \quad (3.8)$$

Where y_{it}=GDP_{it}, x_{it}= ($ED_{it}, EC_{it,} EMPL_{it}, GOV_{it}, HUM_{it}, INV_{it}$) is (4×1) vector explicative variables δ_{ij} is a (4×1) vector with coefficients λ_{ij}a scalar and $\mu_i$represents the fixed effect per country. From that model derive the following long-term relation:

$$y_{it} = \theta_i x_{it} + \mu_{it} \quad (3.9)$$

If the variables are co-integrated, then the term $\varepsilon_{it}$is a stationary process. In this case, the model can be re-specified in the form of a model of errors correction in which the short term dynamic is influenced by the sidelines of the long term relation:

$$\Delta y_{it} = \phi_i (y_{it-1} - \theta_i x_{it}) + \sum_{j=1}^{m-1} \lambda_{ij}^{*} \Delta y_{it-j} + \sum_{j=0}^{n-1} \delta_{ij}^{*} \Delta x_{it-j} + \mu_i + \varepsilon_{it} \quad (3.10)$$

Where $\phi i$is the coefficient of adjustment, is θi the vector of the long term coefficients and Δ is the variation operator between two successive dates. One expects that ϕi<0 . One of the advantages of the models ARDL is that the multipliers of short and long terms are estimated jointly. Moreover, these models authorize the presence of the variable that can be integrated in different ways, either *I (0)* or *I (1)*, or co-integrated (Pesaran and Shin, 1999). The PMG estimator allows the coefficients of short term and the coefficients of adjustment to be varied according to the countries. But, the long term

coefficients are identical for all the countries ($\theta_i = \theta$). In this study, the PMG estimator is based on the following models:

$$\Delta InGDP_{it} = \theta_0 + \phi_i S_{it-1} + \sum_{j=1}^{p} y_{1it}\, \Delta InGDP_{it-i} + \sum_{j=0}^{p} y_{2it}\, \Delta InED_{it-i} + \sum_{j=0}^{p} y_{3it}\, \Delta InEMPL_{it-i} + \sum_{j=0}^{p} Y_{4it}\, \Delta InGDP_{it-i} + \sum_{j=0}^{p} y_{5it}\, \Delta InHUM_{it-i} + \sum_{j=0}^{p} y_{6it}\, \Delta InINV_{it-i} + \mu_{it} \quad (3.11)$$

$$\Delta InGDP_{it} = \theta_0 + \phi_i S_{it-1} + \sum_{j=1}^{p} y_{1it}\, \Delta InGDP_{it-i} + \sum_{j=0}^{p} y_{2it}\, \Delta InEC_{it-i} + \sum_{j=0}^{p} y_{3it}\, \Delta InEMPL_{it-i} + \sum_{j=0}^{p} Y_{4it}\, \Delta InGDP_{it-i} + \sum_{j=0}^{p} y_{5it}\, \Delta InHUM_{it-i} + \sum_{j=0}^{p} y_{6it}\, \Delta InINV_{it-i} + \mu_{it} \quad (3.12)$$

Where S_{it-1} = ($GDP_{it-i} - \theta_i ED_{it} -$ or $\theta_i EC_{it} - \theta_2 EMPL_{it} - \theta_3 GOV_{it} - \theta_4 HUM_{it} - \theta_5 INV_{it}$

Pesaran *et al*. (1999) makes three critical assumptions when estimating a panel ARDL model. First, the disturbance εit are independently and identically distributed across the countries and over time. Second, the panel ARDL model follows a stationary process to guarantee that the coefficient of the error correction term lies within the (0, -1) space: this is important in order to confirm that the long-run relationship between the dependent variable and the explanatory variables exists. For this reason, it is important to ensure that all variables of interest are either (0) or (1) variables. Third, the pooled mean group or model assumes that there is long-run homogeneity where the coefficients of all explanatory variables are similar across the cross-sections in the long run. (Chirwa and Odhiambo, 2018).

3.7 UNIT ROOTS

Before estimating an PMG cointegration model, it is important that one test for unit roots. To evoke, this is an important step since the PMG model can only be used if all the time series variables being modelled are integrated of order I (0) and I (1), and not integrated of order higher than I (2). The data is tested for stationarity to determine if the variables have the same order of integration and. Generally macroeconomic time series variables are found to be nonstationary (Kwofie and Ansah, 2017). The regression of two or more non-stationary variables results in is a regression that provides misleading statistical results (i.e. spurious regression). It is needed to determine the order of integration before using co-integration techniques. For this aim; Levin, Lin and Chi (LLC), Im, Pesaran and Shin (IPS), ADF Fisher Chi-square (ADF Fisher) and PP-Fisher unit root tests are used in the paper. Panel unit root tests have been developed on the similar manner that underlie conventional ADF test. The null for each test is that the series has a unit root while the alternative states that the series is stationary.

3.7.1 LLC Unit Root Test

Levin, Lin and Chu (2002) introduced different panel unit root tests having different specifications dependent upon the assumption about entity specific intercepts terms and time trends. LLC test inflicts homogeneousness on the autoregressive coefficient (intercept and trend may vary across individual series) which shows the presence or nonexistence of unit root. This test is based on ADF regression for examining unit root problem. The common form of LLC test with intercept term only may be written as

$$\Delta y_{i,t} = y_{0i} + p y_{i,t-1} + \sum_{i=0}^{p_i} y_{1i}\, \Delta y_{i,t-j} + \mu_{i,t} \qquad (3.13)$$

In the overhead equation y_{0i} is the constant term which is supposed to differ across cross sectional entities while p is the identical autoregressive coefficient, y_{1i} denotes the lag order, $\mu_{i,t}$is the disturbance term supposed to be sovereign across panel entities and follows ARMA stationary process for every cross section.LLC model is based on t-

statistics, where ρ is supposed to stay fix across entities under null and alternative hypothesis

$$t_p = \frac{\widehat{p}}{SE(\widehat{P})} \tag{3.14}$$

3.7.2 Im, Pesaran and Shin (2003) tests

Im, Pesaran and Shin (2003) (IPS hereafter), using the likelihood framework, suggest a new more flexible and computationally simple unit root testing procedure for panels (which is referred as t-bar statistic), that allows for simultaneous stationary and non-stationary series (i.e. p_i can differ between individuals). Moreover, this test allows for residual serial correlation and heterogeneity of the dynamics and error variances across groups. Instead of pooling the data, *IPS* consider the mean of (*A*)*DF* statistics computed for each cross-section unit in the panel when the error term $u_t$of the model (1.1) is serially correlated, possibly with different serial correlation patterns across cross-sectional units (i.e$\mu_{it} = \sum_{j=1}^{p_i} \varphi_{ij}\, \mu_{it-j} + \varepsilon_{it}$)and T and N are sufficiently large. Substituting this it u in (1.1), and considering a linear trend for each of the N cross-section units, we get:

$$\Delta y_{it} = \alpha_{0i} + p_i y_{it-1} + \sum_{j=1}^{p_i} \varphi_{ij}\, \Delta y_{it-j} + \varepsilon_{it} \tag{3.15}$$

where, as usual, *i*= 1,2,..., *N* , *t* = 1,2,...,*T* . The null hypothesis is:

$$H_0: p_1 = 0 \text{for all i} \tag{3.16}$$

Which is tested against the alternative:

$$H_a: \begin{cases} p_i < 0 \;\; for i \;\; = 1 \ldots\ldots N \\ p_i = 0 for i = N_1 + 1.., N \end{cases} \text{with } 0 < N_1 \leq N \tag{3.17}$$

3.8 COINTEGRATION

After establishing stationarity, the next procedure is to test for the possibility of co-integration among the variables used. The process of converting non-stationary data into stationary data usually is said to lead to loss of the long run relationship between the variables and testing if the variables are co-integrated is a necessity in this research. Co-integration exists if two variables have a long-term, or equilibrium, relationship between them. Brooks (2004) explains that many time series are non-stationary but 'move together' over time; that is, there exist some influences on the series which imply that the two series are bound by some relationship in the long run.

The use of the pooled mean group estimator of the panel ARDL also requires that the study variables should be cointegrated. The econometric literature proposes a number of panel cointegration tests such as Pedroni (1999, 2004) and Kao (1999) cointegration tests that extend the Engle-Granger (1987) cointegration test; and Fisher (1932) and extended by Maddala and Wu (1999) that combines tests from individual cross-sections. The study employs. Pedroni (1999, 2004) and Kao (1999) cointegration tests

3.8.1 Pedroni cointegration test

The Pedroni (1995) test is the most popular among panel co-integration tests. Pedroni also takes into account heterogeneity by using specific parameters, which are allowed to vary across individual members of the sample. Additionally, it also overcomes the problem of a small sample size and more than one cointegrating relationships. This test is based on the estimated residuals from the following long-run model:

$$y_{it} = a_i + \sum_{j-1}^{m} \beta_{ji} X_{jit} + u_{it} \qquad (3.18)$$

Where $u_{it} = p_i u_{i(t-1)} + w_{it}$ are the estimated residuals from the panel regression. $y_{it}$and$X_{jit}$are assumed to be intergrated of order one in levels i.e. I(1).

Pedroni (1995) has proposed seven different statistics to test panel data co-integration. The first type is based on pooling, which is called the within dimension panel approach

including four statistics panel v-statistics, panel ρ-statistics, panel PP-statistic and panel ADF-statistic. These statistics pool the autoregressive coefficients of the residuals for unit root testing (Mehmiid, Raza, Rana, Sohaib and Khan, 2014). The last three statistics based on the between dimension approach (group test), include panel ρ-statistics, panel PP-statistic and group ADF-statistic. These statistics are the simple average of separately estimated coefficient for every group

Under the null hypothesis, all seven test indicates the absences of cointegration: $H_0: p_1 = 0 \forall i$, whereas the alternative hypothesis is given by $H_1: p_1 = p < 1 \forall i$, where p_1, is the autoregressive term of the estimated residual under H_1 given by $\hat{\xi}_{it} = p_i \hat{\xi}_{i,t-1} + u_{i,t}$. The calculated test statistics must be smaller than the tabulated critical value to reject the null hypothesis of the absence of co-integration.

In the case of panel statistics, the first-order autoregressive terms is assumed to be the same across all the cross-sections, while in the case of group panel statistics, the parameter is allowed to vary over the cross section.

3.8.2 Kao cointegration test

Kao is an Engle-Granger based cointegration test that follows the same basic approach as the Pedroni tests, but specifies cross-section specific intercepts and homogeneous coefficients on the first-stage regressors. Kao (1999) uses both DF and ADF to test for cointegation. In outlining the Kao (1999) cointegration test, we assume the residual terms from a panel regression $e_t$can be expressed as:

$$e_t = pe_t + \sum_{j=1}^{n} \Phi_j \, e_{it-j} + v_{itp} \tag{3.19}$$

And from the equation the null hypothesis of no cointegration is given as:

$$H_0: p = 1 \tag{3.20}$$

Kao (1999) suggest that the no cointegration null hypothesis can be tested using the following modified ADF-type test statistic:

$$t_{kao} = \frac{t_{adf}+\sqrt{6N\sigma_V}/(2\sigma_{OV})}{\sqrt{\sigma^2{}_{ov}/(2\sigma^2{}_v)}+3\sigma^2{}_v/(10\sigma^2{}_{ov})} \sim N(0,1) \quad (3.21)$$

Where $t_{adf} = \frac{(p-1)[\sum_{i=1}^{N}(e_1 Q_1 e_1)]^{\frac{1}{2}}}{S_v}$ (3.22)

3.9 PAIRWISE DUMITRESCUHURLIN PANEL CAUSALITY TESTS

Demitrescu and Hurlin (2012) was adopted to test for heterogeneous panel data model. Demitrescu and Hurlin causality test assumes the following (1) it is suitable when the number of countries (N) is growing and the time series (T) data is constant; (2) it is also suitable when T>N and N>T; (3) The test is based on Vector Autoregression; (4) there is no cross sectional dependency. Even if cross sectional dependency is present, the Monte Carlo simulation show that the test can still produce very strong outcomes.

There are two different distributions in different distributions in this test: asymptotic and semi asymptotic distribution is used when T>N, while semi-asymptotic distribution is used when N>T. If the panel data model is taken into consideration:

$$y_{it} = \sum_{k=1}^{k} \gamma_i{}^{(k)} y_{i,t-k} + \sum_{k=1}^{k} \beta_i{}^{(k)} x_{i,t-k} + \varepsilon_{i,t} \quad (3.23)$$

Where $\beta_i=(\beta_i{}^{(1)}, \ldots.., \beta_i{}^{(k)})'$. Dumitrescu-Hurlin (2012) propose a Homogenous Non Causality (HNC) hypothesis defined as:

H_0: $\beta_i = 0, \forall i=1,\ldots., N.$ (3.24)

Where $\beta_i=(\beta_i{}^{(1)}, \ldots.., \beta_i{}^{(k)})$. Under the alternative hypotheses we assume the existence of $N_1<N$ individual processes with no causality from x to y, whilst the remaining process $N_2=N-N_1$ process have causality i.e.

H_1: $\beta_i = 0 \ \forall i = 1,\ldots,N_1$ (3.25)

$\beta_i \neq 0 \ \forall i = N_1+1, N_1+2\ldots,N$

Dumitrescu and Hurlin (2012) propose the use of the following average individual Wald statistic to test the HNC null hypothesis

$$W_{N,T}^{Hnc} = \frac{1}{N}\sum_{i=1}^{N} W_{i,T} \tag{3.26}$$

Where $W_{i,T}$ denotes the individual Wald statistic for the i^{th} cross section unit corresponding to the individual causality hypothesis H_0: $\beta_i = 0$. Dumitrescu-Hurlin (2012) note that the individual Wald statistics provide undesirable distribution properties in small samples hence the authors propose the following approximated standardized statistics:

$$Z_{N,T}^{Hnc} = \sqrt{\frac{N}{2N}}(W_{N,T}^{Hnc} - K) \tag{3.17}$$

$$\hat{Z}_{N}^{Hnc} = \frac{\sqrt{N}[W_{N,T}^{Hnc} - E(\widehat{W}_{i,T})}{\sqrt{Var}(\widehat{W}_{i,T})} \tag{3.28}$$

Where the second order moments of the individual Wald statistics, $W_{i,T}$, only exist if the condition T > 5 + 2K holds. In our study, we limit the lag length to K=5, given that our sample size consists of T=16 observations.

3.10 CONCLUSION

The purpose of this chapter was to formulate the model based on both empirical and economic theory with economic growth being the dependent variable. The main explanatory variables of the model are the export diversification and export concentration. Other explanatory variables include human capital, population, investment and exchange rate. It was therefore established that there is need to test for stationarity so as to avoid problems such as spurious regressions. The LLC, Im, Pasaran and Shin and DF- Fitcher tests were considered. To test for cointegration,

Pedroni cointegration test and Kao cointegration tests we use. Lastly the chapter discussed the Granger causality test which centres on testing for causality between variables.

CHAPTER FOUR

ESTIMATION AND INTERPRETATION OF RESULTS

4.1. INTRODUCTION

Export diversification has been conventionally viewed as a good strategy to follow since it can result in export stability and export growth by implication improved economic growth performance or economic growth. Thus, the main aim of this chapter is: to empirically determine the extent and nature of export diversification and concentration and to find the association between export stability and export growth in South Africa. The results from this chapter provide answers to the questions which were raised in the first chapter of the study: what is the impact of export diversification and export concentration on economic growth in South Africa. To answer these questions, this chapter applies the previously discussed techniques to 20 countries (top ten trading countries in the world and top ten trading countries in Africa) data from the 1995 to 2014. Empirical results of the model stated in Chapter 3 are presented, interpreted and analysed in this chapter. The chapter is sub-divided into seven sections. Following this introductory section, data description and properties are discussed next. On the third section, panel cointegration tests results are presented. After cointegration, the PMG estimates follows in the fourth section, the firth section discusses the causality, and finally the last section concludes the chapter.

4.2. DATA DESCRIPTION AND PROPERTIES

The panel times series data used in our study is collected from three statistical sources. Firstly, our real GDP growth rates (y_t) and government spending variables are collected from the World Bank. Secondly, physical capital (k_t), human capital, (h_t), labour employment (l_t)is collected from the Penn World Tables 9.1. Lastly, our export diversification (ED_t) and export concentration (EC_t) variables are collected from the United Nations Conference on Trade and Development (UNCTAD) online database. The time series are collected for a panel of 20 countries, 10 corresponding to the top global traders (i.e. Canada, China, France, Germany, Italy, Japan, Korea, Netherlands,

United Kingdom and United States,) and the other 10 corresponding to the top African traders (i.e. Algeria, Angola, Cote d'Ivoire, Democratic of Congo, Egypt, Ghana, Morocco, Nigeria, South Africa, Tunisia), and the data is collected on annual frequencies over the period 1995-2017.All employed time series are converted into natural logarithms for empirical purposes.

For each of the panel series we i) compute the descriptive statistics, ii) compute the correlation coefficient between individual variables and GDP and iii) perform panel unit root tests on the first differences of the series. The unit root tests verify the compatibility of the data with the PMG estimators as all time series are found to be stationary in their first differences. Moreover, we observe discrepancies for the correlation coefficients and descriptive statistics between the two samples. For instance, average GDP growth is higher in the global sample whilst GDP volatility is higher for the African sample and average 'export diversification' is higher in the global sample whilst average 'export concentration' is higher for the African sample. These observations represent stylized facts in the literature (Mudenda et al. (2014) and Osakwe et al. (2018)). However, we note that concentration has a negative correlation with growth for the global sample whilst being positively correlated with growth for the African sample and this is counter-intuitive to the conventional literature (Lederman and Maloney (2003), Chandra, Boccardo and Osorio (2007) and Hamed et al. (2014)). The following sub-sections of the paper seek to verify these preliminaries though formal panel cointegration analysis.

Table 4.1. Descriptive statistics and integration properties of time series

		Correlation with GDP		descriptive statistics				unit root tests (performed on first differences)				
				mean	sd	j-b		LLC			IPS	
Panel A: Top global traders												

y		1		1.23	0.91	0.00***		-6.48***	-4.04***		-3.94***	-1.27
ec		-0.173		-1.91	0.52	0.00***		-9.12***	-8.24***		-7.99***	-6.55***
ed		0.095		-0.76	0.27	0.00***		-4.29***	-1.78**		-6.49***	-4.50***
l		0.464		1.08	0.25	0.00***		-3.65***	-4.04***		-3.95***	-3.12***
g		0.262		3.74	1.82	0.01**		-2.73***	-2.11**		-4.34***	-2.42***
h		-0.546		-1.95	0.35	0.17		-2.07**	-2.05**		-0.09	2.16*
k		0.104		-1.38	0.27	0.66		-4.74***	-3.05***		-4.72***	-2.94***
Panel B: Top African traders												
y		1		1.46	0.67	0.00***		-3.60***	-0.97		-8.21***	-6.21***
ec		0.233		-1.07	0.66	0.00***		-7.39***	-6.42***		-7.71***	-5.97***
ed		0.175		-0.35	0.18	0.00***		-6.12***	-4.96***		-7.54***	-6.21***
l		0.079		0.62	0.19	0.00***		-0.08	-2.48***		-1.65**	-3.20***
g		-0.071		2.35	0.75	0.22		0.05	1.94		-5.34***	-3.56***
h		-0.109		-1.93	0.60	0.00***		-1.52*	0.42		1.02	2.51*
k		0.185		-1.74	0.59	0.00***		-4.87***	-3.67***		-5.38***	-4.19***

Note: p-values reported in parentheses. "***', '**', '*' denote the 1%, 5% and 10% critical levels respectively.

4.3. PANEL COINTEGRATION TEST RESULTS

Prior to estimating our PMG models, we perform panel cointegration tests to ensure that our analysis is devoid of the 'spurious regression' problem. We compute the Kao's test statistics for the four estimated growth regressions with two regressions corresponding to the global sample and the other two regressions corresponding to the African sample. The optimal lag length of the regressions has been determined through a minimization of the AIC information criterion with the optimal lag been found at 'lag=1' for all

regressions. All reported Kao test statistics produce estimates which reject the hypothesis of non-stationary panel error terms and this is rejected at significance levels of at least 5 percent. This provides sufficient evidence of cointegration effects in all six regressions and allows us to proceed to the PMG estimates.

Table 4.2: Kao's cointegration tests

regression function	selected lag length	test statistic	p-value
Panel A: top global traders			
y=f(ec, k, h, l, g)	(1,1,1,1,1)	-1.8820	0.02**
y=f(ed, k, h, l, g)	(1,1,1,1,1)	-1.8342	0.02**
Panel B: top African traders			
y=f(ec, k, h, l, g)	(1,1,1,1,1)	-2.7316	0.00***
y=f(ed, k, h, l, g)	(1,1,1,1,1)	-2.8664	0.00***

Note: p-values reported in parentheses. "***', '**', '*' denote the 1%, 5% and 10% critical levels, respectively.

4.4. PMG ESTIMATES

Table 5 presents our main PMG estimates for the different empirical samples and we observe discrepancies on the effects of export diversification/concentration across the different samples as well as over the short-run and the long-run. For instance, over the short-run, we observe a positive and highly statistically significant coefficient estimate on both the export diversification and export concentration variables for the African group whilst being both variables being insignificant for the global sample. However, over the long run these dynamics change as the coefficient on export diversification

becomes statistically insignificant for the African sample whilst turning negative and statistically significant for the global sample. Also, over the long-run, export concentration has a negative and significant estimate for African economies whilst being positive and statistically significant for the global sample.

Note that the negative effect of export concentration on the African sample for the long-run has been previously established in the works of Lederman and Maloney (2003), Chandra et al. (2007), Hesse (2007), Hamed et al. (2014) and Tesfay (2016). Similarly, the insignificant effect of export diversification on growth for the African sample over the long-run has been also found in the recent works of McIntyre et al. (2018) and Duru and Ehidiamhen (2018). Our results also show that export diversification harms growth and export concentration is beneficial growth in the global sample over the long-run. As explained by Imbs and Wacziarg (2003), Klinger and Lederman (2006), Aditya and Roy (2006), Hesse (2011) and Cadot et al. (2011), more advanced economies have crossed their 'threshold' level of development in which diversification is no longer beneficial to growth and these economies should rather 're-concentrate' their trade exports in order to improve growth.

Concerning, the growth conditioning variables like employment, human capital, physical capital and government size, their estimates are quite mixed over the short-run and yet 'more-or-less' produce their theoretical expected positive effect on growth over the long-run, that is, with the exemption of the human capital variable which produces a negative and statistically significant over both sample groups. Note that the finding of a negative effect of human capital is not foreign to the empirical literature (Benhabib and Spiegel (1994), Kalaitzidakis et al (2001) and Pritchett (2001)).We lastly, observe that the error correction terms produce their correct negative and statistically significant estimates which implies presence of reversion back to the steady-state equilibrium in case of a shock to the system. Note that all in all three samples the ECT associated with the 'export diversification' growth function produces larger, absolute values which means diversification is quicker in adjustment process back to the long-run subsequent to an external shock to the system.

Table 4.4: PMG estimates

		Top 10 global trading countries			Top 10 African trading countries	
Variable		A	B		A	B
Panel A: Short-run						
∆ec		-0.517 (0.47)			1.5614 (0.02)**	
∆ed			3.527 (0.22)			1.9724 (0.06)*
∆l		25.76 (0.01)**	33.63 (0.05)*		-55.145 (0.14)	-27.19 (0.18)
∆g		-3.3353 (0.05)*	-3.432 (0.02)**		-1.1965 (0.21)	-1.205 (0.16)
∆h		-14.751 (0.88)	-34.443 (0.79)		19.6047 (0.61)	45.5065 (0.49)
∆k		1.7875 (0.15)	2.9229 (0.06)*		0.9569 (0.22)	0.9619 (0.07)*
ect		-0.7992 (0.00)***	-0.8607 (0.00)***		-0.7071 (0.00)***	-0.8335 (0.00)***
Panel B: Long-run						
ec		1.0184 (0.00)***			-2.1617 (0.00)***	

ed			-2.1214 (0.03)*			-0.6500 (0.22)
l		-1.3801 (0.21)	-1.1585 (0.30)		1.7720 (0.00)***	1.5169 (0.00)***
g		0.7761 (0.01)**	1.3545 (0.00)***		0.2198 (0.13)	0.1807 (0.29)
h		-3.5346 (0.00)***	-3.6551 (0.02)**		-4.1176 (0.01)**	-3.5071 (0.02)**
k		0.9373 (0.05)*	1.6222 (0.00)***		0.7739 (0.00)***	1.188 (0.00)***

Note: p-values reported in parentheses. "***', '**', '*' denote the 1%, 5% and 10% critical levels, respectively.

A: GDP=f(ec, l, g, h, k)

B: GDP=f(ed, l, g, h, k)

4.5. CAUSALITY TESTS

So far, we have investigated the cointegration relationship between export diversification-concentration and economic growth, and we are yet to address the issue of causality direction between the time series. Table 4.5 presents the pairwise panel causality tests of Dumitrescu-Hurlin (2012) performed between i) export concentration and economic growth and ii) export concentration and economic growth. From panel A, which reports the findings for the top global trading economies, the F-statistics fail to reject the null hypothesis of homogenous non-causality for two cases. The first is for causality running from export diversification towards economic growth and the second is for causality running from economic growth to export specialization. In merging these findings with those obtained from our PMG estimates implies export specialization positively leads to improved economic growth in more industrialized economies

whereas improved economic growth leads to lower concentration levels. From panel B, which reports the findings for the African sample, all reported F-statistics produce estimates which do not exceed their 10 percent critical values hence rejecting any significance causality effects between the variables. These results imply that past values of export diversification and concentration in African countries do not predict future values of GDP growth, and similarly past values of economic growth do not predict diversification-concentration levels.

Table 4.5: Panel causality tests

Panel A: Top 10 trading economies worldwide				
Null hypothesis				
ED does not homogenously cause GDP	3.806	4.413	0.019**	Uni-directional causality from ED to GDP
GDP does not homogenously cause ED	0.830	0.566	0.571	
EC does not homogenously cause GDP	1.255	0.1446	0.883	Uni-directional causality from GDP to EC
GDP does not homogenously cause EC	2.577	2.357	0.014**	
Panel B: Top 10 African trading economies				

Null hypothesis				
ED does not homogenously cause GDP	0.876	0.484	0.628	No causality
GDP does not homogenously cause ED	1.620	0.761	0.444	
EC does not homogenously cause GDP	1.412	0.415	0.667	No causality
GDP does not homogenously cause EC	1.711	0.919	0.358	

Notes: p-values reported in parentheses. '***', '**', '*' denote the 1%, 5% and 10% critical levels, respectively.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The purpose of this chapter is to summarise and conclude the study. The conclusions are based on the literature review and empirical findings. The chapter also outlines the limitations of this study. Finally, the study provides potential recommendations with the intentions of allocating the best possible policies for decision making in South Africa. The next section in dedicated to the summary of the results. Section 6.3 gives policy recommendations based on the findings and sections 6.4 discusses the limitations of the study and suggest areas for further research.

This study sought to investigate the role of export concentration and diversification on economic growth. The researcher selected this topic to investigate whether export concentration has a negative effect and export diversification has a positive effect on economic growth or not as well as to test if export diversification leads to the growth and stability of countries. This study is motivated by the widely increasing debate that developing countries should diversify their export base or mix in-order to increase economic growth as well as to maintain competitiveness and stability.

5.2. SUMMARY OF THE RESULTS

There exists a universal tenant advocating for a shift of trade focus from concentration to diversification of exports with African economies being encouraged to follow in pursuit in the interest of accelerating ‘catch-up’ effects towards the economic developmental levels of more industrialized economies. Our study undertook a comparative approach to demonstrate discrepancies in the trade structure-growth nexus between the top 10 African trading countries and the top 10 global countries using data spanning between 1995 and 2017. We estimated an endogenous growth model augmented with a trade sector to empirically examine the short-run and long-run cointegration relationship between export diversification and growth, on one hand, and export concentration and

growth, on the other hand. Moreover, we perform panel causality test amongst the variables using the heterogeneous non-causality tests of Dumitrescuand Hurlin (2012).

Over the short-run, we find both export diversification and concentration are beneficial for economic growth in the African sample and yet insignificant for the global sample. Conversely, over the long-run we find export concentration to be harmful for growth in the African sample and beneficial for growth in the sample whereas diversification is harmful for growth in the global sample and insignificant for the African sample. At face value, our results concur with those for the previous literature which find i) export concentration to hamper long-run growth for less developed countries whose export baskets primarily consist of agricultural and mineral products and ii) export concentration to be beneficial for economies who have higher levels of economic development and may need to re-concentrate their exports. However, in performing panel causality tests we find significant causality relations for the global sample and not for the African sample.

5.3. POLICY IMPLICATIONS AND RECOMMENDATIONS

In drawing policy implications, we firstly observe that altering the trade structure in African countries has not been the cause of the recently experienced growth surge and may not be an overall panacea towards sustainable long-run growth. This implies that policymakers in African countries should not focus on the structure of overall trade but rather on identifying which individual trade baskets foster the most positive influence on growth. Such inquiries are reserved as future research endeavours. For industrialized economies, our result support notion of industrialized economies having crossed their ‘turning point’ where export diversification is beneficial to economic growth. Therefore, the policy prescription of ‘re-concentrating’ of export structure is recommended for more industrialized economies in attempts to rejuvenate their current low growth rates. Future research could be directed at identifying specific export baskets which industrialized economies should ‘concentrate’ on to improve their economic growth.

5.4 LIMITATIONS OF THE STUDY AND AREAS FOR FURTHER RESEARCH

The study did not look at some other aspects of export diversification such as vertical and horizontal dimensions of export diversification, various measures of export diversification, comparison of the relationship between export diversification and economic growth across the various developing regions of the world, and specific–country analysis of the relationship between export diversification and economic growth for all the countries in the sample.

The scope of the study is to analyse the relationship between export diversification, export concentration and economic growth in the top ten trading countries in Africa and top ten trading countries in the World, limited to the period 1995- 2014.

While the research was conducted for the data available between 1995 and 2014, further analysis could be conducted on the strength of the relationship between exports diversification, export concentration and the economic growth for more time periods.

This study included human capital, employment, investment and government expenditure only as explanatory variable. Other variables can be included in the future studies.

These areas of study would also make very meaningful contributions to the existing literature and therefore should be considered by future studies on the diversification–growth nexus.

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