The Potential Impact on Trade of a Monetary Union in Southern Africa

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Abstract

Southern Africa has been exploring regional integration in the context of the Southern African Development Community (SADC). This dissertation seeks to examine the potential bilateral trade volume within SADC, that can be generated as a result of a hypothetical SADC currency union and to analyse its importance for policy. It can serve as a basis for the promotion of regional integration as a means of increasing intraregional trade in the region, on the continent and, ultimately, international trade. Regional monetary unions are envisaged by the African Union (AU) as building blocks towards an eventual continent-wide monetary union. In this respect a gravity model was estimated with panel data using pooled Ordinary Least Squares (OLS), random and fixed effect estimations covering the period 2000 to 2017**.** Because a SADC multilateral currency union does not exist yet, similar existing versions of monetary integration arrangements in the region were used in this study to draw inferences. The monetary integration arrangements in the region include the Common Monetary Area, a fixed exchange rate regime adopted by South Africa, Namibia, Lesotho and Eswatini, as well as Zimbabwe's multicurrency regime that includes the South African Rand and the Botswana Pula.

The results are largely in line with theoretical expectations except for the currency union dummy variable coefficient which was found to not be statistically significantly different from zero. This therefore means that in the case of SADC, a currency union might not have an effect on bilateral trade flows between member countries. One major limitation lies in the fact that my analysis relies on data based on currency union proxies since a SADC currency union does

not already exist. Thus, any extrapolation from my results to infer the impact of an actual currency union on trade might lead to less than robust conclusions.

PLAGIARISM DECLARATION

I, Sharon Mbano, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorize the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

Signed: Signed by candidate Date: 10 February 2019

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GLOSSARY OF ACRONYMS

AMU	Arab Maghreb Union
AR	Autoregression
AU	African Union
BCEAO	Banque Centrale des Etats de l'Afrique de l'Ouest
CAR	Central African Republic
CEMAC	Economic and Monetary Community of Central Africa
CEN-SAD	Community of Sahel-Saharan States
CEPGL	Economic Community of Great Lakes Countries
CFA	Financial Cooperation in Central Africa
CFTA	Continental Free Trade Area
CIA	Central Intelligence Agency
CIF	Cost, Insurance and Freight
CMA	Common Monetary Area
COMESA	Common Market for Eastern and Southern Africa
DOT	Direction of Trade
DRC	Democratic Republic of the Congo
EAC	East African Community
EAC	East African Community
ECB	European Central Bank
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EMU	European Monetary Union
EU	European Union
FEM	Fixed Effect Model
FOB	Free on Board
FTA	Free Trade Area
GDP	Gross Domestic Product
IGAD	Intergovernmental Authority on Development
IMF	International Monetary Fund
IMF	International Monetary Fund
OAU	Organisation of African Unity
OCA	Optimum Currency Area
OLS	Ordinary Least Squares

PTA	Preferential Trade Area
PTC	Permanent Tripartite Commission
REC	Regional Economic Community
REM	Random Effect Model
RI	Regional Integration
ROW	Rest of the World
RTA	Regional Trade Agreement
SACU	Southern African Customs Union
SADC	Southern African Development Community
SADC	Southern African Development Community
SADCC	Southern African Development Coordination Conference
SAIIA	South African Institute of International Affairs
SARB	South African Reserve Bank
TFTA	Tripartite Free Trade Area
UDEAC	Central African Customs and Economic Union
US	United States
USD	United States Dollars
VIF	Variance Inflation Factor
WAEMU	West African Financial and Economic Union
WAMZ	Western African Monetary Zone

CHAPTER 1. INTRODUCTION

1.1 Background

The issue of monetary integration as an economic policy tool has garnered new-found interest in Africa. Giving rise to the question, "Does monetary integration boost trade between trading partners?". Within Africa, there have been several recent monetary integration initiatives, and achieving a continent wide monetary union by 2021 has been adopted as a formal objective by the African Union (AU) (Fourie & Santana-Gallego, 2009). This has been motivated in part by the experience of the European Monetary Union (EMU), which is widely perceived as having been both successful and beneficial to member countries. The EMU, also known as the Eurozone, is an economic and monetary union of 17 of the European Union (EU) member states that have adopted the Euro as their common currency and sole legal tender[1].The European Union was motivated initially by political imperatives but due to increased globalization, stronger regional and global economic integration started to play a central role (Fendel & Maurer, 2015). Southern Africa has been exploring regional integration in the context of the Southern African Development Community (SADC), a 15-member country free trade agreement (FTA)[2]. Following the 2006 summit of SADC leaders, a proposal was forwarded for a multilateral monetary union that would include all the SADC countries represented in figure 1 below.

The process leading to a monetary union comprises of several stages including macroeconomic convergence, monetary integration and ultimately a common currency and a central bank (Jefferis, 2007). This is known as the linear approach to economic integration which involves moving from preferential trade agreements (PTA), followed by FTAs, customs unions, a single market and then lastly economic and monetary union (Fourie and Santana-Gallego, 2009). Traditional customs union theory as postulated by Viner (1950) distinguishes between two welfare effects that is, trade creation and trade diversion[3]. Trade creation increases welfare while in general trade diversion results in a loss of welfare. In the linear approach, a common

[1]While the European Union (UN) is a political and economic union of 28-member states, the EMU an economic and monetary union is a subset of this grouping whose monetary policy is determined by the European Central Bank (ECB).

[2] As of August 2018, the Union of the Comoros was admitted as a full member of SADC. See http://www.sadc.int/member-states/comoros/.

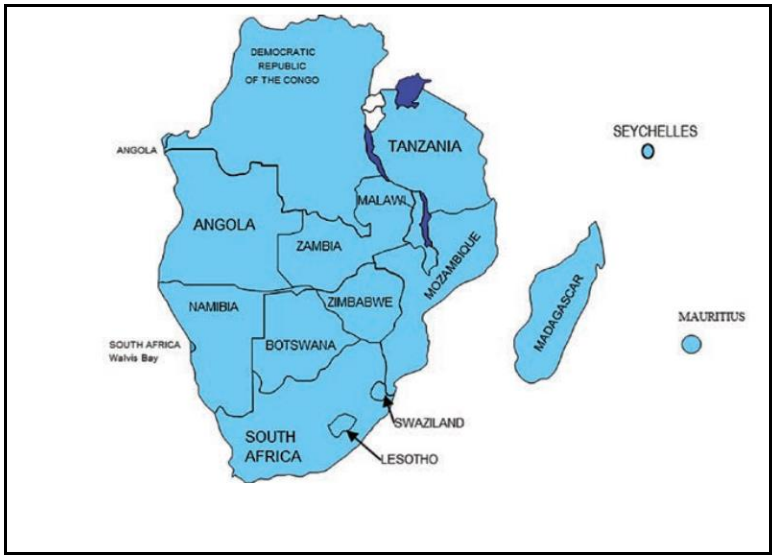
[3] Trade creation is a result of a member country importing more from a country where the cost of production is lower and trade diversion results from a member country switching its imports from a country with a lower cost of production to a country with a higher cost of production.

currency is assumed as the final step towards the integration process, as is the case with the Eurozone. A currency union may also be a result of a fixed exchange rate regime (Mundell, 2002). One such example is the long history of trade and monetary integration of the Southern African countries of South Africa, Eswatini, Lesotho, Botswana and Namibia. All five countries are members of the Southern African Customs Union (SACU) with all countries benefiting from the elimination of tariffs when trading with each other. All the other four countries are highly integrated with the South African economy where South Africa accounts for 50% of exports and imports of these countries. SACU countries, with the exception of Botswana, are also members of the Common Monetary Area (CMA) which was established in 1986 between South Africa, Lesotho and Eswatini, with Namibia joining in 1992. Under this agreement, each country still retains the right to issue its own national currency, albeit the currency is pegged at 1:1 to the Rand. Not only is the Rand legal tender in the member countries, but there is also free capital flow between member countries (Masson, 2006). Although the CMA cannot be fully classified as a monetary union due to the absence of a common central bank, the central banks of the smaller CMA member countries are heavily influenced by the South African Reserve Bank's (SARB) monetary policy (Nchake *et al*, 2018). The last and most extreme version of a currency union that was considered in this dissertation is dollarization. That is, adopting a foreign currency as legal tender (Nitsch, 2002). An example of this type of exchange rate regime in Southern Africa is Zimbabwe and its implementation of a multicurrency regime including the US dollar, the Rand and the Pula.

Advantages of monetary unions have been well documented, and these are both political and economic. These include the promotion of trade, efficiency gains, improved quality and credibility of macroeconomic policymaking that all ultimately result in economic growth. However, it may be appropriate to be cautious about rushing the process of monetary integration. Drawing from the lessons of the EMUs experiences, which is still in its infancy, it is therefore too early to draw precise empirical assessments. While the Euro has been widely accepted by member countries, issues remain with regards to the adoption of a one size fits all monetary policy and the choice of appropriate fiscal policy rules. Because fiscal policies are determined at a national level, fiscal authorities may pursue macroeconomic policies that are contrary to those of the monetary authorities (Beetsman and Giuliodori, 2010). A monetary union in the African context would have to be implemented credibly and sequentially after considering the benefits of a monetary union. The outcomes of the analysis will be dependent on political, economic and the social cultural differences of the countries concerned and the

degree of macroeconomic divergence among these countries. The African developmental context is very different from that of Europe and therefore it does not necessarily follow that what might work in Europe can easily be transferred or replicated in the African context.

Figure 1. SADC member states



Source: (The African Capacity Building Foundation, 2016)

1.2 Problem statement

The relevance of regional integration is a pertinent issue in Africa, specifically in view of a myriad of political and economic challenges that the continent faces. According to Alves, Draper and Khumalo (2009), the presence of entry barriers to the markets of developed countries, minimal share of world trade, and low pace of development in human capital and infrastructure act as deterrents for the realisation of the African regional integration agenda. Ensuring the success of regional economic integration in Africa is important, not only because of the challenges cited above, but also because of the policy implications for the process of globalization and the successful integration of Africa into the world economy. Owing to these facts, regional integration in Africa is a must, in the hopes that it will help enhance economic development and growth on the continent (Negasi, 2009). There are plenty of empirical studies regarding the effects of regional economic integration on trade flows. Various researchers employ different methods to analyse the effects of regional economic integration and the findings are mixed. Although early empirical studies used cross-sectional data to estimate

gravity models (Rose, Lockwood and Quah, 2000), most researchers nowadays use panel data[4] (Glick & Rose, 2001). One reason for the preferred use of panel data is that the extra time series observations result in more robust estimates. However, these studies predominantly focus their analysis on developed countries. This indicates a limitation with regards to policymakers making inferences about the impact of regional economic integration for developing countries in the African context. To the best of my knowledge, little work has been done to employ the panel data approach at African regional level. Despite several empirical contributions in recent years, the impact of regional economic integration on trade in the SADC region using the gravity model has not been investigated rigorously. This void motivates my study which focuses on SADC membership and its effects on trade using bilateral trade data from 2000 to 2017. To assess the impact of a hypothetical SADC currency union on trade flows of member nations, this study relies on a gravity model and disaggregated data. An augmented gravity model of panel data approach is used to investigate whether a SADC currency union will result in an increase in intraregional trade between member countries.

1.3 Statement of research objectives

The main objective of this dissertation is to gain a better understanding of the impact on bilateral trade flows between SADC member countries as a result of a hypothetical regional currency union. Because a SADC multilateral currency union does not exist yet, similar existing versions of monetary integration arrangements were used to draw inferences[5]. Furthermore, the dissertation also examines the following specific objectives in addition to the broader objective:

- To analyse the impact on trade flows between the SADC member country trading pairs if they all adopt a common currency and relinquish their monetary policy to a common central bank.
- To give recommendations to policymakers given the findings on the potential effectiveness and feasibility of a currency union in SADC.

[4] Panel data is a combination of cross-sectional data and time-series data resulting in more observations.

[5] These monetary integration arrangements include the Common Monetary Area (CMA), which has its members Namibia, Lesotho and Eswatini, formerly known as Swaziland, pegging their respective currencies to the South African Rand at the rate of 1:1 and the multicurrency regime adopted by Zimbabwe in 2009 which includes the use of the Rand and the Pula as legal tender in the country.

1.4 Research Hypothesis

The null hypothesis for the study is:

H_0: No relationship exists between increase in trade activity of a SADC country trading pair as a result of sharing a common currency.

Tested against the alternative hypothesis that:

H_1: A positive relationship does exist between increase in trade activity of a SADC country trading pair as a result of sharing a common currency.

1.5 Purpose and Significance of Study

In this dissertation I seek to quantify the impact on bilateral trade of a SADC currency union and to analyse its importance for policy. It can serve as a basis for the promotion of regional integration as a means of increasing intraregional trade in the region and on the continent and ultimately international trade. Furthermore, considering the number of regional monetary integration initiatives underway in Africa a study of the impact on trade of a currency union is important. The results can shed light on the desirability for individual countries to take part in such an initiative and the approach to be adopted, taking into account the benefits and the costs of such an undertaking.

1.6 Organisation of Study

The dissertation is organized as follows. The first chapter begins with the introduction giving the background of the study followed by the second chapter which covers the overview on the existing SADC regional economic communities. The third chapter investigates the existing trade theories and the literature review on empirical studies conducted on the subject matter. In chapter 4, I review the methodology to be used detailing sample selection, and the empirical analysis framework. Chapter 5 reports and discusses the results. The last chapter looks at the justifications of conducting the study and the usefulness of the research.

CHAPTER 2. SUMMARY ON REGIONAL ECONOMIC INTEGRATION

2.1 Introduction

This chapter will provide a detailed background on the regional economic communities in Africa in view of regional integration being central in the continent's efforts to boost intraregional and global trade. A thorough discussion of relevant key terms and definitions is undertaken in section two, to provide clarity and consistency on the concepts used in this study. Section three will further provide insight on the costs and benefits derived from sharing a common currency to motivate the importance of investigating the impact a currency union can have on trade. An account on the formation and the lessons drawn from the EU experience is given in section 4. The detailed background and operations of the seven African Regional Economic Communities (RECs) recognised by the AU is outlined in the fifth section. An overview of the progress with regards to economic and political integration of the different RECs and a summary of the relevant findings concludes the chapter.

2.2 Definition of a currency union

A currency union is defined by Masson (2006) as a geographical area characterised by a group of countries throughout which a single currency circulates as the principal medium of exchange. A currency union which is the culmination of monetary integration, also known as a monetary union or a common currency area, entails multiple countries ceding control over the supply of money to a common authority, usually a central bank. Monetary policy is a common tool utilised by national governments to manage economic shocks and changes in the money supply. By giving up control of its monetary policy a nation exposes itself to economic policy limitations. A monetary union is an extreme form of a fixed exchange rate regime whereby countries retain national currencies but agree to adjust the relative supply of these to maintain a desired rate of exchange (Chipeta and Mkandawire, 1994). Both exchange rate regimes are classified as hard pegs and differ in the degree of monetary independence they enjoy. While the monetary policies of member countries of a fixed exchange rate regime are determined by the anchor country's monetary policy they still retain some degree of monetary policy independence, whereas member countries of a monetary union completely relinquish their monetary policy independence to a common central bank (Jefferis, 2007). Hard pegs have several advantages that include reduced transaction costs that traders incur when switching currencies in carrying out international transactions and low stable interest rates.

According to Chipeta and Mkandawire (1994) elements of a monetary union include;

i) The adoption of a common single currency for all monetary union members.

ii) A common monetary and fiscal policy to ensure collective control over the rate of money creation and the expansion of government expenditure.

iii) Management of a union of the common pool of the foreign exchange reserves, external debt and exchange rate policy.

iv) Convergence of domestic credit achieved by imposing a credit ceiling although the allocation and distribution of domestic credit between sectors remains with the national monetary authorities.

v) In the case of the adoption of a common currency, the existence of a central bank serving as a regional monetary authority that becomes the sole issuer of the common currency.

vi) A common development bank that serves to finance regional and national projects to assist in the integration process of member nations and to reduce economic differences between members.

Monetary integration can take many forms and can be considered as a process ranging from no monetary and policy integration to a full monetary union. Table 1 summarises the different stages of monetary integration and the policy implication at each stage. The four stages of monetary integration and their respective characteristics are;

i) No monetary integration (floating exchange rates, no monetary policy harmonisation)

ii) Weak monetary integration (linked exchange rates and capital mobility, partial monetary policy co-ordination)

iii) Strong monetary integration (fixed exchange rate, monetary policy harmonisation)

iv) Full monetary integration (monetary union, single currency, single central bank)

Under stage 1, no monetary integration, there is no attempt to co-ordinate the monetary policies of different countries, although it is possible that national monetary policies can move together with other countries if they experience similar external shocks. The exchange rates will be freely floating against each other and countries will have monetary policy autonomy. Under stage 2 exchange rates are to some extent linked either through a managed float that constrains exchange rates within a predetermined band or a crawling peg arrangement. In a crawling peg regime, authorities announce a central parity and the associated maximum and minimum margins of fluctuations around the central parity. Depending on the flexibility of capital mobility this might have an implication on monetary policy autonomy with more autonomy

being experienced if a country retains capital control. Under stage 3, strong monetary integration, the exchange rates of national currencies are pegged to each other. In the case of full capital mobility, a common monetary policy will be followed with co-ordinated movement in interest rates. The last stage, full monetary union, is the conclusion of the process of monetary integration where all member nations commit to adopt a single common currency and a single central bank that manages monetary policy. Member countries give up their monetary or exchange rate policy autonomy.

Table 1. Monetary Integration Stages

Policy Choice	**Degree of Monetary Integration**			
	None	**Weak**	**Strong**	**Full**
Exchange Rate	Floating	Constrained Float/ Crawling Peg	Fixed Peg	Single Currency
Capital Market	Exchange (Capital) controls possible	Progressive removal of capital controls Equal treatment across jurisdictions		
Other		Removal of controls on labour mobility Stricter limits on fiscal deficits and public debt Trade liberalisation, Stabilisation of financial sector and strengthening of supervision		
Monetary Policy Implication	Unconstrained	Constrained by exchange rate targets and capital movement	Co-ordinated movements in interest rates	Single central bank and benchmark interest rate

Source: (Jefferis, 2007)

2.3 Criteria for a successful currency union

Mundell's (1961) theory of optimum currency area argues that a currency union will tend to be less costly for countries that experience high convergence of economic variables as opposed other countries in the union. He further postulated that the effectiveness of an optimum currency area can be constrained by the immobility of factors of production, that is, labour and capital, because shifts in demand facing one country relative to another can lead to unemployment in the absence of a flexible exchange rate regime. He also highlighted that price and wage flexibility are also important for a country coping with demand shocks. Another prerequisite

for a successful monetary union is the need for a similar economic structure in terms of market openness, trade patterns and product diversification. Similar levels of per capita income among member unions are important because countries that generally have the same income levels tend to have similar levels of institutional development and a shared convergence interest. Free trade between countries in a union, flexible prices and a financial system with common rules and supervision makes for a mutually beneficial monetary union. In the absence of the factors highlighted a monetary union could be disadvantageous to the member countries if they fail to respond to shocks using suitable policies and this will result in lower growth and ultimately poverty. The criteria identified above were illustrated by the EMU through the establishment of a free trade area followed by a customs union, followed by the removal of controls on capital and labour movements and the introduction of a common currency (the Euro). This eliminated transaction costs between members and ensured the convergence of national fiscal positions.

The potential benefits of a monetary union include generating fiscal discipline for governments that will limit their propensity to pursue irresponsible macroeconomic policies. A monetary union also limits the incidences of currency speculation and contagion effects that can contribute to exchange rate volatility. In addition, an optimum currency area facilitates the exploitation of economies of scale in the financial sector that will create greater efficiency. Lastly the potential increase in trade accruing from reduced transaction costs and exchange rate stability. On the contrary, a monetary union comes with potential losses resulting from reduced national autonomy and therefore a constrained ability to respond to economic shocks. An optimum currency area therefore is attainable when the benefits of monetary unification outweigh the costs associated with monetary integration.

2.4 Overview of the EU

2.4.1 The formation of the EMU and its sustainability

The EMU was a culmination of sequencing of processes, starting with trade integration through the common market, which is similar to the RECs that already exist in Africa. An investigation of the origins of the EMU will shed light on the sustainability of currency integration in Africa specifically Southern Africa. Sadeh and Verdun (2009) suggest currency integration was motivated by increasing globalisation which encouraged the quest for international uniformity. Neo-functionalists argue that the formation of the EMU was propelled by the trade integration among EU member countries. The lack of a common currency between these member countries was one of the only trade barriers that remained after completing the internal market project.

The Mundell-Fleming model argues that a country's government cannot simultaneously maintain a fixed exchange rate, free capital movement, and an independent monetary policy that can be used to achieve domestic policy goals. It must choose any of the two for control and leave the other for market forces. This is known as the impossible trinity (Wyplosz, 2001). In the context of EMU member countries, the freeing of capital flows between countries as part of the single market project[6] meant that exchange rate stability could only come at the expense of a country's independent monetary policy. Therefore, the formation of the EMU was a natural extension to the single market project (Padoa-Schioppa, 2000). Scholars largely agree that the formation of the EMU was and remains a politically motivated endeavour, motivated by the continental desire to minimize the destabilizing effect of the US economic and foreign policies (Sadeh & Verdun, 2009). Another school of thought presents the formation of a currency union as a political alliance that is dependent on the balance of national interests (Beetsman & Giuliodori, 2010). For France the EMU was attractive for gaining more control of interest rates. On the other hand, Germany traded control of their monetary policy for international legitimacy, lower cost for its unification and economic advantage for its industry. At a domestic level the formation of the EMU was largely supported by the big businesses, multinationals, high-tech industries as well as labour organisations and was viewed as explaining the macroeconomic convergence period of the EMU process but not necessarily all the other phases (Sadeh & Verdun, 2009).

2.4.2 Lessons for Africa's Regional Economic Communities from the EMU

Europe's successful integration was a sequencing of gradually increasing co-operation that developed from one form to another. Initially trade integration was achieved with fixed but adjustable exchange rates, while keeping domestic and external financial markets under tight control. A thirty-year process saw the liberalisation of financial markets and exchange rate stability stemming from the common market. Through the establishment of the common market, Europe was able to achieve the minimum degree of real convergence that is necessary for the viability of a currency union. Continued integration in Europe has been attributed to the existence of collective institutions such as the common market and the ECB. These collective institutions become the driving force for integration through allowing for professional assessments and analysis that will aid in eliminating potentially costly mistakes. Real economic convergence refers to the stage of development a country has achieved and is not only limited

[6] The European single market project, also known as the internal market or common market project, is a single market which seeks to guarantee the free movement of goods, capital, services and labour within the EU.

to trade integration but also monetary integration. Convergence is more complicated the wider the economic gap between countries (Wyplosz,2001).

2.5 Overview of Regional Economic Communities in Africa

2.5.1 Introduction

The broader objective of the African Union (AU) to establish an African Economic community by 2021 is now being pursued through Regional Economic Communities (RECs) as trade has been identified as a powerful tool for economic growth and development. Regional monetary unions are envisaged by the AU as building blocks towards an eventual continent-wide monetary union. A central aim of a monetary union is to reduce transaction costs and uncertainties that arise from exchanging one currency to another, allowing for greater price transparency since all goods are priced in the same currency. The AU currently recognises eight RECs as detailed in Table 2 below, namely the Arab Maghreb Union (AMU), the Common Market for Eastern and Southern Africa (COMESA), the Community of Sahel-Saharan States (CEN-SAD) the East African Community (EAC), the Economic Community of Central African States (ECCAS), the Economic Community of Western Africa (ECOWAS) the Intergovernmental Authority on Development (IGAD) and the Southern African Development Community (SADC). Other than the stated RECs other regional economic communities also exist, and these include Southern African Customs Union (SACU) and the CMA with some member countries having membership in more than one of these trade arrangements.

Table 2. Regional Integration Arrangements in Africa

Acronym	Full Name	Year Established	Member States	Goal
AMU	Arab Maghreb Union	1989	Algeria, Libya, Mauritania, Morocco, and Tunisia	Full economic union
ECCAS	Economic Community of Central African States	1983	Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Congo (DRC), Equatorial Guinea, Gabon, and São Tomé and Príncipe	Full economic union
CEN-SAD	Community of Sahel-Saharan States	1998	Benin, Burkina Faso, Central African Republic, Chad, Comoros, Côte d'Ivoire, Djibouti, Egypt, Eritrea, Gambia, Ghana, Guinea, Guinea-	Free trade association

			Bissau, Libya, Mali, Mauritania, Morocco, Niger, Nigeria, Senegal, Sierra Leone, Somalia, Sudan, Togo, and Tunisia	
COMESA	Common Market for Eastern and Southern Africa; followed PTA	1993	Burundi, Comoros, Congo (DRC), Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Eswatini, Uganda, Zambia, and Zimbabwe	Full economic union
EAC	East African Community	2000	Burundi, Kenya, Rwanda, Tanzania, and Uganda	Political federation
ECOWAS	Economic Community of West African States	1975	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo	Full economic union
IGAD	Intergovernmental Authority for Development	1996	Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda Eritrea joined in 1993 but suspended membership in 2007	Full economic union
SADC	Southern African Development Community	1992	Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Eswatini, Tanzania, Zambia, and Zimbabwe	Full economic union

Source: (African Capacity Building Foundation, 2016)

2.5.2 Economic Community of West African States (ECOWAS)

As detailed on the ECOWAS website (http://www.ecowas.int) the grouping was established in Abuja, Nigeria through a treaty signed on the 28th of May 1975. The Economic Community of West African States (ECOWAS) is a regional group of 15 nations. The 15 ECOWAS member states are Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Its major goal was to promote cooperation and development amongst member states in all fields of monetary activity. In 1993, ECOWAS broadened its mandate, following a revision of its original treaty, to encompass issues of monetary, socio-political, and cultural policies, with the goal of ultimately forming a monetary union. According to the survey conducted by the African Capacity Building Foundation (2016) the largest economy inside the ECOWAS sub-region is Nigeria, which is also Africa's most populous country, accounting for 73.4 percent of the sub-region's actual

GDP and up to 19 percent of Africa's overall GDP. Ghana, the sub-region's second-largest economy, represents 8 percent of ECOWAS exports, far lower than Nigeria, but considerably higher than Gambia and Guinea-Bissau, which rank as the smallest economies of the sub-region. Like most of Africa, the services sector of ECOWAS member states leads in economic significance, comprising 44.8 percent of general regional GDP, followed by agriculture (33.8 percent), and enterprise (21 percent).

Despite developments in the free movement of people, infrastructural development, improvement of telecom links amongst member states, and preservation of peace and security, sub-regional market integration has been very slow. The achievements have not significantly translated into increased intraregional enterprise. Intragroup exports still only account for 9 percent of total ECOWAS trade, compared with 20 percent for the East Africa Community (EAC) and 17 percent for the Southern African Development Community (SADC). Even though member states attempt to overcome language barriers and geopolitical challenges, the divide amongst Anglophone and Francophone states, and to some extent, the Lusophone states, still complicate the integration efforts. In 1994, a sub-group of eight-member states, except for Guinea-Bissau whose administrative structure imitates that of France, formed the West African Financial and Economic Union (WAEMU). These member states have a common currency, the CFA franc, which was inherited at independence and its convertibility is guaranteed by France's Treasury. Additionally, this sub-group has a commonplace economic policy implemented with the aid of a common valuable financial institution, the Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO). As a result, the WAEMU nations have made more progress toward financial integration than the rest of the ECOWAS nations. The non-WAEMU nations, except for Cabo Verde, have consequently formed the West African Monetary Zone (WAMZ), which aims to in the end merge with WAEMU to form a single ECOWAS monetary region. However, progress has been slow and the ECOWAS-WAEMU convergence remains elusive (African Capacity Building Foundation, 2016).

2.5.3 Common Market for Eastern and Southern Africa (COMESA)

The Common Market for Eastern and Southern Africa (COMESA) website (http://wwwcomesa.int) provides a background on COMESA. COMESA is a group of 19-member states and was founded in 1993 as a successor to the Preferential Trade Area for Eastern and Southern Africa (PTA). The PTA was established in 1981 as part of the framework of the Organization of African Unity (OAU) whose treaty terms required the PTA's

transformation into a common market, 10 years after its establishment. COMESA formally succeeded the PTA on 8 December 1994 upon the treaty's ratification by 11 signatory states. The REC has 19-member states that include Burundi, Comoros, DRC, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Eswatini, Uganda, Zambia, and Zimbabwe. COMESA was mainly established to take advantage of a larger market size, share the region's common heritage and destiny, and allow greater social and economic cooperation, with the ultimate objective of joining the African Economic Community. COMESA's principal focus is promoting regional integration through trade development, investment promotion, and sustainable use of natural resources for the mutual benefit of all citizens. The COMESA approach to regional integration is the classical, stage-by-stage gradual method of progressing from preferential trade area (PTA) to free trade area (FTA) to customs union to common market and eventual monetary union. By 2025, COMESA expects to be a single trade and investment area in which tariffs, non-tariffs, and other impediments to the movement of goods, services, capital, and people will seize to exist. By then, the region also expects to have achieved global market competitiveness in goods and services trade, while doubling per-capita income thanks to steady expansion of the regional economy. Statistics from the survey conducted by African Capacity Building Foundation (2016) indicate that COMESA's largest economy is Egypt, accounting for 37 percent of the sub-region's total GDP, followed by Sudan (9.6 percent), Libya (8.8 percent) and Kenya (8.8 percent). The services sector accounts for 51.5 percent of total GDP in the COMESA sub-region, followed by industry (27.4 percent) and agriculture (21.1 percent). Leading countries when it comes to services are Seychelles (81.3 percent share of GDP), Djibouti (75.7 percent), and Mauritius (72.2 percent).

COMESA is ahead of other African RECs in terms of advancements in trade and trade facilitation. 14 of the 19-member states have so far signed up to the COMESA Free Trade Area, where all goods originating from the region are granted duty-free, quota-free market access to all other members of the COMESA FTA which happens to be Africa's largest FTA. The most successful COMESA institutions include the Clearing House, which has now established an international payment system called the Regional Payment and Settlement System, the Leather Products Institute, and the Alliance for Commodity Trade in Eastern and Southern Africa. COMESA's financial institutions, including the PTA Bank, the Re-insurance Agency, and the African Trade Insurance Agency, have spread throughout Africa and enjoy excellent global rankings. More than 20 years after the establishment of COMESA, the free movement of people

within the bloc is still an elusive goal. Member states are either unwilling or too slow to ratify the protocol which would eliminate restrictions on such travel. So far, only four countries (Burundi, Kenya, Rwanda and Zimbabwe) have signed the protocol, and only Burundi has fully ratified it. Mauritius, Rwanda, and Seychelles have also waived visa requirements for citizens of all COMESA member states, while Zambia has issued a circular waiving visas and visa fees for all COMESA nationals on official business (African Capacity Building Foundation, 2016).

2.5.4 Arab Maghreb Union (AMU)

According to The Arab Maghreb Union (AMU) website (http://www.umaghrebarabe.org) the REC was founded in Marrakesh on 17 February 1989 by the five signers of the Constitutive Treaty of the Union: Algeria, Libya, Mauritania, Morocco, and Tunisia. The treaty took effect on 1 July 1989. At its signing, member states agreed to coordinate, harmonize, and rationalize their policies and strategies for sustainable development in all sectors of human activity. The five North African states fashioned the AMU after the European Union (EU), originally intending to create a body through which members could negotiate trade relationships with the EU and improve relations among its member states. Specifically, the AMU sets out the conditions for an eventual free trade zone among member states, a unified customs regime for extra-union trade, and a common market where people, products, and capital circulate freely. However, hopes for substantial political and economic integration in the Maghreb region quickly dimmed as inter-state political tension–especially between Morocco and Algeria over the status of Western Sahara–complicated the union's consolidation. Indeed, no summit of AMU heads of state has taken place since 1994. More recently, political instability sparked by the Arab Spring uprisings has created further uncertainty about the union's future. The AMU has become more active as relations between Algeria and Morocco have improved. Since 1999, it has established several joint bodies to address common concerns, including the Maghrebi Bank for Investment and External Trade, the Working Group on Fisheries, and the Maghrebi Desertification Observatory. The African Capacity Building Foundation (2016) survey found that Industry (mining, manufacturing and construction) comprised 43.2 percent, and services 44.8 percent, of the sub-region's GDP. The five AMU states envision an investment bank, capitalized at $100 million, to partner with the private sector to fund regional infrastructure projects in Algeria, Libya, Mauritania, Morocco, and Tunisia. But the bank's launch first proposed in 1991 with equal participation from each country has been delayed by political tensions within the union, and by a long-running dispute between Algeria and Morocco over Western Sahara.

2.5.5 Economic Community of Central African States (ECCAS)

According to the ECCAS website (http://www.ceeac.eccas.org) the REC was established in 1983. The Economic Community of Central African States (ECCAS) grew out of the Economic Community of Great Lakes Countries (CEPGL) and the Central African Customs and Economic Union (UDEAC). Its original objective was to promote exchange among member states and provide an institutional and legal framework for such cooperation, but the goal of ECCAS is now to accelerate Central Africa's physical, economic, and monetary integration. Current members are Angola, Burundi, Cameroon, Central African Republic (CAR), Chad, Congo (Brazzaville), DRC, Equatorial Guinea, Gabon, Rwanda, and São Tomé and Príncipe. ECCAS has overlapping membership with the Central African Monetary Union (CEMAC), to which Chad, CAR, Congo-Brazzaville, Gabon, Equatorial Guinea, and São Tomé and Príncipe belong. In its first decade of existence, ECCAS performed poorly, largely a consequence of its members' lack of commitment and failure to pay their quotas (African Capacity Building Foundation, 2016). The DRC war was particularly divisive, with Rwanda and Angola fighting on opposing sides. In 1998, ECCAS was revived, and its agenda was restructured and broadened to include not only economic but political and security issues as well. However, despite these laudable programs, ECCAS does not operate optimally due to the conflict and social strife. In addition, it has very weak institutional and organizational capacity, and lacks a critical mass of competent professional and support staff to drive the regional integration plan. ECCAS member states derive the largest share of their revenues from industry (47 percent), followed by services (34 percent) and agriculture (18.3 percent), This contrasts with Africa's other RECs, which depend more on services. The ECCAS sub-region is blessed with enormous natural resources: a vast forest that can absorb about 500 million tons of carbon dioxide; huge deposits of diamonds, uranium, gold, copper, iron, cobalt, manganese, columbite-tantalites, and other minerals; and estimated proven oil reserves of 31.3 billion barrels, about 28 percent of Africa's total. ECCAS member states also have huge agricultural potential; ample water resources, thanks to the Congo-Oubangui-Sangha Basin, the Lake Chad Basin, the Great Lakes region, and internal navigable waterways. It also has vast hydroelectricity generating potential, dominated by the Inga dam in the DRC's Bas-Congo region, which alone represents 60 percent of Africa's potential hydroelectric generating capacity. In addition, Central Africa's strategic position could make it a future transit hub, as it is the only region that borders all of Africa's other regions. Y*et al*l these opportunities need capacity building to be effectively coordinated and implemented within the ECCAS agenda (African Capacity Building Foundation, 2016).

2.5.6 East African Community (EAC)

East Africa has a long history of regional integration that dates back to the 1917 creation of the original East African Community by Kenya and Uganda, which Tanganyika (the predecessor to today's Tanzania) joined in 1927 as detailed on the EAC website (http://www.eac.int). The current EAC, established on 7 July 2000, has its roots in the Mediation Agreement for Division of Assets and Liabilities of the original EAC, which collapsed for a variety of political and economic reasons in 1977. In that agreement, signed 14 May 1984, Kenya, Tanzania, and Uganda agreed to explore areas of future cooperation, and make concrete arrangements for such cooperation. Subsequent meetings of the three heads of state led to the signing of the Agreement for the Establishment of the Permanent Tripartite Commission (PTC) for East African Cooperation on 30 November 1993. Full-fledged cooperation began 14 March 1996 with the launching of the PTC Secretariat at EAC headquarters in Arusha, Tanzania. In June 2007, Burundi and Rwanda joined the original members, Kenya, Tanzania, and Uganda. The five states with a common history and culture founded the EAC to pursue their vision of a prosperous, competitive, secure, stable, and politically united East Africa. Their goal is to be an economic area (including customs and monetary unions, with harmonized macroeconomic policies, and ultimately a political federation), to better compete in the global market, improve conditions for domestic industries, and increase trade and investment in the region, which in turn will improve the quality of life for all East Africans. The EAC Customs Union became operational in January 2005, the protocol to establish it having been signed only in March 2004. In 2007, Rwanda and Burundi became full members of the EAC, but would not join the customs union until two years later. Talks aimed at merging the EAC, COMESA, and SADC into one free trade area began in 2008 at the Tripartite Summit held in Kampala, Uganda. At the EAC's 10th anniversary in 2009, the Protocol for the Establishment of the EAC Common Market was signed. A year later, the EAC Common Market Protocol entered into force, following ratification by all the five EAC partner states. According to the African Capacity Building Foundation (2016) survey, of Africa's eight RECs, the East African Community has registered the most progress the on integration. While the others are in the process of establishing either free trade areas or customs unions, only the EAC has developed a fully functional FTA. It did this by first implementing a customs union that linked Kenya, Tanzania, and Uganda; Rwanda and Burundi joined the other three in July 2009. A year later, the EAC established a common market, and in 2013, it adopted a protocol outlining its plan to form a monetary union in 10 years, an ambitious move unmatched by any other African REC. To monitor its progress, the

EAC has published The East African Common Market Score Card 2014. It tracks EAC compliance in the movement of capital, services and goods. The report showed that Tanzania and Burundi are the most restrictive when it comes to cross-border trade. In addition, cargo transit times have been slashed from 18 to 4 days from Kenya's port of Mombasa to Kampala, Uganda, and from 21 to 6 days from Mombasa to Kigali, Rwanda. Kenya, Uganda, and Rwanda have introduced a single tourist visa, and markets are emerging for the movement of professionals within the region through a framework for mutual recognition of professional standards (Drummond and Williams, 2015).

2.5.7 Southern African Development Community (SADC)

According to the SADC website (http://www.sadc.int), the initiative for the establishment of structures to promote cooperation between member states was propelled by Frontline States, which originally comprised Angola, Botswana, Mozambique, Tanzania, and Zambia. Although politically independent, these countries faced mass poverty, economic backwardness, and the threat of powerful and hostile white minority-ruled neighbours. Hence, the leaders of these Frontline States saw the promotion of economic and social development through cooperation and integration as the next logical step for economic emancipation. This led to the launch of the Southern African Development Coordination Conference (SADCC) at an April 1980 summit in Lusaka, Zambia by the region's nine majority-ruled states at the time. These were Angola, Botswana, Lesotho, Malawi, Mozambique, Eswatini, Tanzania, Zambia, and Zimbabwe. SADCC's goals were to reduce economic dependence particularly, but not only, on South Africa; to forge links to create real and equitable regional integration; to mobilize resources to put in place national and regional policies; and to take concerted action to secure global cooperation within the framework of economic liberation. The need to strengthen SADCC, which became apparent in the late 1980s, led to the signing of a treaty transforming the coordination conference into SADC, the community. Formed in 1992, SADC hoped to address many of the factors that make it difficult to sustain economic growth and socioeconomic development, such as continued dependence on the exports of a few primary commodities. In the 1990s, membership in SADC rose to 15 with the accession of Namibia in 1990, South Africa in 1994, Mauritius in 1995, and Seychelles and the DRC in 1997. Madagascar's membership was reinstated in January 2014 after an imposed suspension in 2009.

Statistics from the African Capacity Building Foundation (2016) survey found that the region covers 9,864,775 square kilometres and has a total population of 293 million. SADC's

merchandise trade products are dominated by minerals, lubricants, and related materials (35 percent), followed by manufactured goods (21.9 percent) and crude materials (10.2 percent). This trade composition is especially different from that of most African RECs like ECOWAS, ECCAS, COMESA, and IGAD, where trade compositions are led mainly by primary commodities. SADC's intraregional trade policies have paid off over the years, redirecting exports from the rest of the world to the regional level. Perhaps this is due to the economic activities of South Africa's neighbours (Zimbabwe, Lesotho, and Eswatini) all of which depend deeply on the South African economy. Indeed, South Africa is a strategic hub for most SADC states; 10 of them count South Africa as one of their top five trading partners. Therefore, any economic and trade policy shifts by South Africa will have high multiplier effects on the other SADC members. On 10 June 2015, the Heads of State and Government of SADC, the Common Market for Eastern and Southern Africa (COMESA), and the East African Community (EAC) met in Sharm El Sheikh, Egypt, at the Third Tripartite Summit to officially launch the COMESA-EAC-SADC Tripartite Free Trade Area (TFTA). This TFTA represents an integrated market of 26 nations with a combined population of 632 million, which is 57 percent of Africa's population; its GDP of $1.3 trillion represents 58 percent of Africa's total GDP. Establishment of the TFTA will clearly bolster intraregional trade by creating a wider market, boosting investment flows, enhancing competitiveness and encouraging regional infrastructure development. In line with its vision and agenda, SADC set up several ambitious targets but has failed to achieve most of them. A trade protocol signed by 11 of the sub-region's 15-member states in 2000 sought to liberalize 85 percent of intraregional trade by 2008 and 100 percent of trade by 2012. It also hoped to form a regional customs union by 2010. All these targets have been missed. Efforts to establish a common market by 2012 and a monetary union by 2016 have also not been achieved. Finally, nearly all SADC members have shown a propensity to promote their own national economic and political interests, contrary to the regional vision enshrined in its protocols. This partly explains why southern Africa has been so slow to implement accords that encourage regional integration. Multiple and concurrent memberships to numerous regional economic communities (RECs) have presented the most daunting challenge to regional economic integration within SADC. South Africa, Botswana, Lesotho, and Eswatini are members of both SADC and the Southern African Customs Union (SACU), headquartered in Windhoek, Namibia, while Namibia and Eswatini both hold memberships in three regional integration pacts and belong to the Common Monetary Area, which also includes South Africa and Lesotho. In addition, 9 of SADC's 15 members also belong to COMESA. Consequently, multiple memberships are not only costly, but they also create inefficiencies,

and are partly responsible for the limited capacity and success of SADC and other RECs. South Africa's control of SADC is an obstacle to regional integration. This one country accounts for over 60 percent of all intra-SADC trade and about 70 percent of the subgroup's total GDP. Given this vast economic power asymmetry between South Africa and other SADC and SACU members, the country cannot be treated as an equal partner. The result is that South Africa has been able to flout regulations without much protest from other members. It is also negotiating its own Economic Partnership Agreement with the EU rather than on behalf of the regional bloc.

2.5.8 Intergovernmental Authority on Development (IGAD)

In 1996 according to the IGAD website (http://www.igad.int), IGAD replaced the Intergovernmental Authority on Drought and Development, which had been established in 1986 by Djibouti, Ethiopia, Kenya, Somalia, Sudan, and Uganda, in the aftermath of a 12-year drought that had caused widespread famine, ecological degradation, and economic decline throughout the Horn of Africa. The revitalized body, meeting in Djibouti, expanded its mandate to coordinate and harmonize policies in the areas of socioeconomic and agricultural development, environmental protection, and political and humanitarian affairs. Following its re-engineering, the African Union meeting in Banjul in July 2006, recognized IGAD as a strong and viable regional economic community (REC). A January 2008 protocol on the relationship between the AU and Africa's RECs recognized IGAD as a full-fledged REC, rejecting a high-level recommendation that would have relegated it to an organization dealing only with peace and security as well as desertification matters. IGAD's membership increased to eight nations after Eritrea gained independence in 1993; South Sudan followed suit in 2011. IGAD's mission is to "promote regional cooperation and integration to add value to member states' efforts in achieving peace, security, and prosperity." Among IGAD nations, landlocked South Sudan had the highest industry share, at 59.6 percent. South Sudan, which joined the regional bloc in 2011, is almost 100 percent reliant on crude oil exports to China and Japan. Similarly, industry accounted for 23 percent of Eritrea's total GDP in 2013, sustained mainly from exports of gold, silver, iron ore, and other high-value minerals. While other RECs have pursued customs unions, free trade agreements, and even common currencies among their members, IGAD has yet to take even the most basic steps toward regional economic integration; its plan to create a free trade area by 2012 never materialized. Indeed, as the Horn of Africa suffers, integration remains very low on the IGAD agenda, with few achievements recorded in the last decade. Parallel membership in other integration schemes has had a particularly negative impact on the

effectiveness of IGAD. Kenya, for example, belongs to five regional schemes (IGAD, COMESA, EAC, CEN-SAD, and ICGLR), while Uganda and Sudan each belong to 4 (IGAD, COMESA, EAC, and ICGLR). Kenya and Uganda are also more deeply committed to the EAC. Elsewhere in the Horn of Africa, Eritrea continues to use force to settle policy differences with its neighbours, Ethiopia remains oblivious to regional markets, and Somalia has little control over its own trade, diplomacy, and macroeconomic policy (African Capacity Building Foundation, 2016).

2.5.9 Continental Free Trade Area

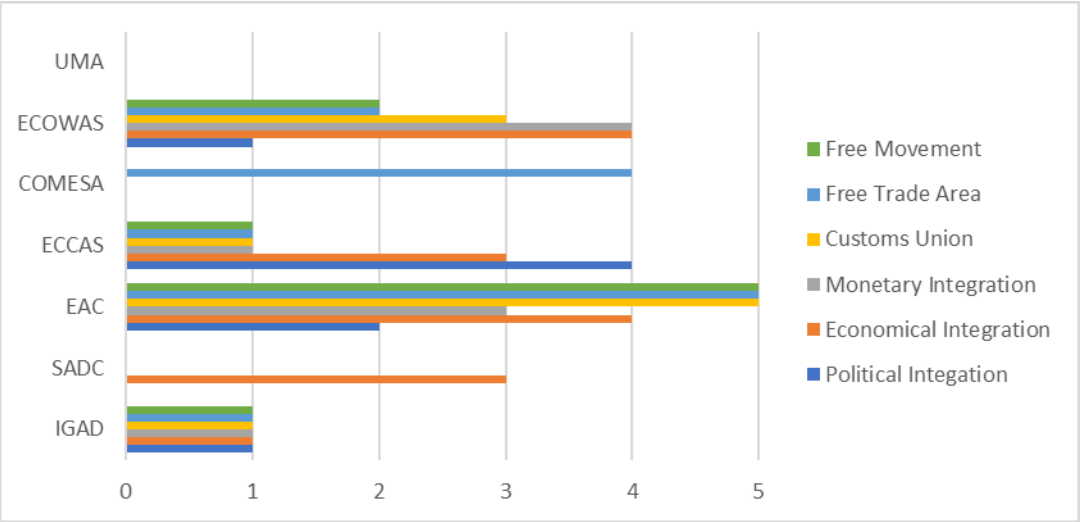
At the 18th Ordinary Session of the Heads of State and Government of the AU held in Addis Ababa Ethiopia according to the AU website (https://au.int/en/ti/cfta/about), a decision was adopted to establish a Continental Free Trade Area (CFTA). The proposed CFTA which was expected to be launched in 2017 will bring together 44 African countries. These African Countries have a combined GDP of US $3.4 Trillion and a combined estimated population of more than 1 Billion. The main objectives of the CFTA include establishing a continental customs union that will foster a single market for goods and services, with the free movement of labour and capital across borders. The CFTA is also envisioned to increase intra-African trade through the improved harmonization and coordination of trade liberalisation and facilitation across the African RECs. This initiative is also expected to stimulate competitiveness at the industry and enterprise level through access to a wider continental market and the effective reallocation of factors of production.

2.6 Conclusion

As shown in Figure 2, a REC that focuses its mandate on a specific pillar of regional integration tends to complete that stage much more quickly. For example, COMESA is closer to completing the only pillar on which its mandate is focused which is the creation of a free trade area with 16 of its 19-member states having ratified the common market protocols. On the other hand, RECs that focused on many regional integration pillars simultaneously appear to have difficulties completing any one of these intended pillars. This is evidently the case with ECCAS, ECOWAS, SADC, and IGAD. ECCAS is now focused on resolving Central Africa's political crisis at the expense of other crises. ECOWAS has inaugurated its FTA and plans to launch a customs union, but faces many obstacles, including the hesitation of some member states to fully engage themselves in sensitive areas like a free trade area or a common currency. EAC seems to be an exception, with remarkable progress in all pillars. Three of its main pillars

are effective: political and economic integration, as well as monetary integration after the endorsement and ratification of the common currency protocol. AMU is relatively slower. It is still in the earliest stage of enhancing cooperation among its member states.

Figure 2. Level of completion for each of the regional integration stages by pillar



Source: (The African Capacity Building Foundation, 2016)

CHAPTER 3. LITERATURE REVIEW

3.1 Introduction

This chapter will provide the theory behind international trade and a review of the literature on the application of the gravity model to assess the impact of a currency union on the volume of bilateral trade. To answer the question of why countries trade, an overview of international trade theories is given. These include the classical trade theory, the new trade theory and the gravity model. A summary of the relevant findings concludes the chapter.

3.2 International Trade Theories

The Classical Trade Theory is founded in Adam Smith's Absolute Advantage Theory of trade and it postulates that the extent to which a country exports and imports relates to its trading pattern with other nations. That is, countries can gain if each devotes resources to the generation of goods and services in which they have an economic advantage (Smith,1776). Smith's arguments, though relevant for a country which has an absolute advantage in the production of a specific good, do not explain how a country which lacks an absolute advantage in production can still benefit from international trade. David Ricardo extended Adam Smith's theory and established a fundamental theory of international trade, known as the principles of comparative advantage. According to Ricardo (1817), a nation gains from trade by exporting the goods or services in which it has its greatest comparative advantage in productivity and importing those it has the least comparative advantage. Therefore, the Classical Trade Theory effectively describes the scenario where a country generates goods and services in which it has an advantage, for consumption indigenously, and subsequently exports the surplus. Consequently, it is sensible for countries to import those goods and services in which they have an economic disadvantage. Economic advantages or disadvantages may arise from country differences in factors such as resource endowments, labour, capital, technology or entrepreneurship. Thus, the Classical Trade Theory contends that the basis for international trade can be sourced to differences in production characteristics and resource endowments which are founded on domestic differences in natural and acquired economic advantages. However, even though the Ricardian model is a basis for international trade, it is still deficient. The model assumes an unrealistic degree of specialization and that all countries benefit from trade (Morgan & Katsikeas, 1997).

The classical theory of trade is prone to several shortcomings, which motivated nineteenth and twentieth century economists to modify the existing theory of trade. Ohlin (1952) developed an influential theory known as the Factor Proportion Theory or the Hecksher-Ohlin model. The Factor Proportion Theory, in contrast to the Classical Trade Theory, can provide an explanation for the differences in advantage exhibited by trading countries. According to this theory, countries will tend to export goods and services that utilise their abundant production factors that they possess intensively, while they will import goods and services that utilise scarce production factors intensively (Thai, 2006). Therefore, this theory extends the concept of economic advantage by considering the endowment and costs of factors of production. The Hecksher-Ohlin model assumes that the only apparent differences between countries is the relative endowment of factors of production, the technologies utilised are assumed to be the same. This is contrary to the Ricardian model which assumes production technologies differ between countries. Generally, in the Hecksher-Ohlin model trade does not lead to complete specialisation between countries an assumption which remedies the defect of the Ricardian model which argues that trade leads to specialisation. The Hecksher-Ohlin model further distinguishes itself from the Ricardian model through the argument that not every country gains from trade, because of the income distribution effect inherent in international trade. The ultimate gainers from trade are the countries with abundant factors of production relative to those with scarce factors of production.

Both these theories have been shown to be deficient in explaining more recent patterns of international trade, which motivated the establishment of the New Trade Theory by Krugman and Maurice (2005). The New Trade Theory seeks to explain the huge proportion of trade between nations with similar factor endowments. The New Trade Theory contradicts the Classical Trade Theory which suggests that countries which are less similar tend to trade more. The New Trade Theory explains international trade based on economies of scale imperfect competition and product differentiation which relax the strict assumptions of the classical theory of constant return of scale, perfect competition and homogenous goods. Under the assumptions of the New Trade Theory a country can specialise in producing a narrow range of products at a large scale with economies of scale. The said country can then increase the variety of goods available to its consumers through trade. Trade therefore occurs despite trading nations not having different factor endowments (Thai, 2006).

Although the classical and the new trade theories can successfully explain the reason for countries to engage in international trade they however cannot answer the question of the size

of the trade flows. The gravity model has been used intensively to quantify the trade flow between countries. The model applies Newton's theory of universal gravitation which relates the force of attraction between two objects to their respective masses and the distance between them. Tinbergen (1964) proposed that the same principle can be applied to explain the bilateral trade flows where trade is estimated as an increasing function of the trading partner's income measured by a country's GDP, and a decreasing function of the distance between them. Initially these models were criticised for lacking a proper theoretical justification. Anderson (1979) and Bergstrand (1985) were the first to formally attempt to address this criticism and derived the gravity equation theoretically. Dummy variables are included in the gravity equation in order to represent quantitative variables such as common language, trade agreements and currency union effects in bilateral trade.

The following section will review empirical studies that have investigated the impact of currency unions on bilateral trade flows.

3.3 Empirical Studies

In his influential paper on the impact of currency unions on bilateral trade, Rose (2000) utilised an augmented gravity model of bilateral trade that included a currency union dummy variable as an independent variable. To estimate the effect of a currency union on trade a sample of 186 countries was used. The primary objective of the paper was to resolve the standing argument that both a reduction in exchange rate volatility and a common currency influence trade and hence the respective effect can be measured separately. Rose (2000) further postulated that an increase in trade as a result of a common currency would lead to enhanced political and global integration through the synchronisation of business cycles across countries. To trace the effect of a currency union and exchange rate volatility on trade, a cross-sectional variation approach was used. A cross-sectional variation approach involves the use of data associated with the values of many different variables that are collected at a single point in time (Misman, 2017). The study identified 300 country pairs with common currencies and found that a common currency increases bilateral trade by three times the original level of trade, all things being equal. In a subsequent study conducted by Glick and Rose (2001) they argued that from a policy perspective, how much of an impact a currency union has on those countries that adopt it, is a pertinent question. To answer this question, the authors studied the impact of a currency union using panel data spanning 1948 to 1997. The panel data analysis allowed for more country pairs with periods in which they shared currencies as well as periods in which they did not. The results of their study indicated a doubling of trade for country pairs sharing a common currency.

Rose and van Wincoop, (2001) further investigated the trade-generating effect of currency union membership by using Anderson and van Wincoop (2003) structural model to address country-specific idiosyncrasies. This approach, which was applied only to countries with complete bilateral data, reduced the effect of currency unions on trade to about two-and-a-half times.

These results have generated immense interest and controversy in the academic community, and numerous studies have followed. One such critique was by Tenreyro (2001) who argued that the model used by Rose omitted some variables that could be pro-trade and correlated with the currency union dummy. This omission could have the effect of biasing the estimate upwards. Other critiques of the model were the presence of reverse causality in that bilateral trade flows could cause a common currency union rather than the other way around. Further, the model was argued to be prone to misspecification (Persson, 2001). Most of these studies point out methodological or data limitations in the earlier analyses and find a smaller impact of currency unions on trade. For example, Nitsch (2002) states that it is possible to find a specification in which the effect of currency unions on trade is essentially zero. Allowing for isolated effects of different languages, preferential trade arrangements and trading pairs that have a common coloniser, the estimated coefficient on the common currency dummy becomes statistically insignificant. Baldwin (2006) concludes in his study that the reasonable common currency effects for the EMU should be in the range of 5 to 15 percent increase in trade. Most of the criticism of the Rose effect found a reduced effect but arrived at the same conclusion that a positive relationship exists between countries adopting a common currency and an increase in bilateral trade. In general, these studies challenge the magnitude of the estimated effect of currency unions in the research conducted by Rose (2000), but do not question the validity of its existence or the direction of the effect. Subsequent work by Rose and other scholars found a reduced effect although it remained significant roughly a doubling of trade (Glick and Rose, 2001).

In the findings by Masson and Pattillo (2004), restricting the sample to African countries and using the same methodology by Rose (2000), the resulting estimates of the common currency effect are like the conclusions drawn by Rose (2000). Tsangarides, Ewenczyk, Hulej, and Qureshi (2009) found that sharing a currency enhances trade and increases price co-movements but decreases the co-movement of shocks to real GDP (that is, increases specialization). Considering the potential and estimated impact of currency unions on trade, the African

continent presents an interesting case to assess the relative potential impact of currency unions and FTAs on intraregional and international trade. This is because the continent has a rich history of currency unions and preferential regional trade agreements in West Africa, but nonetheless world trade participation remains limited. According to Chipeta and Mkandawire (1994) "various explanations have been proposed for Africa's marginalization in global trade activity, including slow economic growth, unfavourable geographical and exogenous factors, poor infrastructure, ill-planned trade policies, weak governance and institutions, barriers to intraregional trade, and constraints on factor mobility". Further, the substantial savings on transaction costs that accrue from a monetary union and imply an increase in trade benefits may be limited in Africa because of lower diversification and a heavy dependence on primary commodities (Chipeta and Mkandawire, 1994). The loss of nominal exchange rate flexibility makes real adjustments to asymmetric shocks more difficult, especially in view of the poor systems of fiscal transfers and the limited development of the banking and financial sectors. In this context, Asonuma, Debrun and Masson (2012) "show that gains from adopting a common currency depend, among other factors, on the correlation of terms-of-trade shocks. This, in turn, is connected to the countries' dependence on primary commodities and their prices". They also show that joining a currency union or accepting a new member in a multilateral union is subject to the existence of interest groups. This observation is noteworthy as it implies that differences in government spending propensities may be more important than asymmetric shocks for the benefits/losses arising from joining a currency union.

Using Glick and Rose's (2002) specification, Masson and Pattillo (2004) examine the impact of currency unions on trade in Africa. "Their estimated effect of currency unions on African bilateral trade with the rest of the world (ROW) is almost the same as for the world: currency unions increase trade threefold in both Africa and the world". However, the currency union variable used by Masson and Pattillo (2004) uses the FTA definition from Glick and Rose (2002), which does not distinguish between FTA and currency union effects. Tsangarides *et al* (2009) overcome this limitation by constructing separate variables for FTA and currency unions and identifying their impacts separately. "Their findings suggest that African countries stand to benefit at least as much from currency union membership as other countries in the world; therefore, currency union benefits are not region-specific". Specifically, the results show that countries belonging to a currency union trade, on average, about one-and-a-half times more with each other than with other comparable countries that do not share a currency. Carrere (2004) posits that African regional trade agreements have generated a significant increase in

trade between members, and further, currency unions have to a large extent increased the positive effects of these regional trade agreements on intra-regional trade. To assess the average impact of each regional trade agreement in Sub-Saharan Africa on trade, Carrere (2004) considers the period 1962 to 1996 and adopted an augmented gravity model in which specific dummy variables were assigned to allow for the observation of trade creation and trade diversion effects separately. The study by Nchake *et a*l (2018) examining the effect of a monetary union on product market integration using disaggregated product price data from the emerging African economies of Botswana, South Africa and Lesotho, also found evidence to support the notion that the effective alignment in interest rate and exchange rate policies enhances the integration of product markets between trading countries. In his study Negasi (2009) analysed trade creation and diversion effects of SADC using data from 2000 to 2007 and estimated an augmented gravity model. Contrary to other findings his results suggested that while SADC countries enter into trade agreements to enhance intra-SADC trade in the agricultural and light manufacturing sectors, they still have retained trade with the rest of the world thereby creating a negative trade diversion effect.

-3.4 Conclusion

This chapter summarizes relevant theoretical and empirical literature investigating the impact of currency unions on bilateral trade flows. An overview of international trade theories was given. These include the classical trade theory, the new trade theory and the gravity model. A summary of the relevant findings concludes the chapter. Thereafter, an investigation of the application of the gravity model was explored; and lastly, key findings from the empirical literature are highlighted. In light of the reviewed body of knowledge, this dissertation seeks to address the limited empirical evidence on the impact on trade of a hypothetical SADC currency union.

CHAPTER 4. METHODOLOGY

4.1 Introduction

This chapter presents the research methodology that operationalizes the empirical approach undertaken by this study; and is organized into five distinct, yet unified main sections. The second section describes the data used in this study and its source. The third section presents the research approach; outlining the potential effect a currency union has on regional trade. The fourth section describes the estimation strategy and details the specification of the estimating equations. The fifth section addresses the reliability, validity, and limitations presented by this study.

4.2 Data set

In this dissertation, I estimated the effect of currency unions on trade exploiting time series (as well as cross-sectional) variation using the gravity model as exploited by Rose (2000). The dissertation used the direction of trade (DOT) data set developed by the International Monetary Fund (IMF). The DOT data set covered bilateral trade between 210 IMF country codes. The dissertation limited the analysis to just the 15-member countries of SADC covering the period from the year 2000 to 2017. Bilateral trade on free on board (FOB) exports and cost, insurance and freight (CIF) imports was recorded in United States dollars (USD). An average value for bilateral trade between a pair of countries was arrived at by averaging the four possible measures available[7]. The average value for bilateral trade was preferred as applied by Rose (2000) given the four available possible measures trade between a trading pair. Other control variables were added to this data set, that are necessary to estimate the gravity model. These added variables include population and real GDP data which were obtained from the World Bank's "World Development Indicators". Where information is missing observations were obtained from the IMF's "International Financial Statistics". For country specific variables that include land area, landlocked and island status, the distance between country pairs, common language shared and shared land border status, the Central Intelligence Agency's (CIA's) "World Factbook" and the "World Development Indicators" data were used. I obtained data from the World Trade Organization to create an indicator of regional trade agreements, specifically a country's SADC membership status at a given time. The bilateral distance

[7] That is the four-way uni-directional bilateral trade flows between two trading countries, country i and country j and these are, country i exports to country j, country j exports to country i, country i imports from country j and country j imports from country i.

between the different countries' economic centres was also accessible on www.indo.com/distance and the "geodist" tool was used to measure the distance in kilometres. The "geodist" tool measures the geographic distance between a country's capital city and the capital cities of respective partner countries. Lastly information was added on whether the pair of countries was involved in a currency union. By "currency union" I mean essentially that money was interchangeable between the two countries at a 1:1 par for an extended period of time, so that there was no need to convert prices when trading between a pair of countries. My basic source for currency union data is the IMF's Annual Report on Exchange Rate Arrangements and Exchange Restrictions. The definition for a currency union is transitive in that if country x and y are in a currency union and country x and z are also in a currency union then it follows that country y and z are also in a currency union (Glick and Rose, 2001).

4.3 Research Approach

The estimation of the gravity equation is done by using ordinary least squares (OLS) to measure the coefficient of the gravity model in a panel data framework. The use of panel data methodology has several advantages relative to using the cross-section methodology. Panel data analysis makes it possible to capture the relevant relations among variables over time. Secondly panel data makes it easier to monitor the possible unobservable individual effects of a trading pair of countries. My approach was to use an econometric model that attempts to make predictions based on past performance. In this case trade between two partners was affected by their size and proximity. From the literature the random effects model (REM) would be more suitable when estimating typical trade flows between a randomly selected sample of trading partners from a large population. On the other hand, the fixed effects model (FEM) would be more ideal than REM when estimating typical trade flow between a predetermined selection of nations (Egger, 2002). Since my sample included all 15-member countries of the SADC the FEM was more suited to the analysis.

4.4 Analytical Framework

As adopted from the study by Rose (2000), the generalized gravity model of trade estimates the volume of average bilateral trade between pairs of countries, X_{ij}, as a function of their incomes (GDPs), their populations, their geographical distance and a set of dummies and is given by;

$$X_{ij} = F(\beta_0 Y_i {}^{\beta}{}_1 Y_j^{\beta}{}_2 Pop_i^{\beta}{}_3 Pop_j^{\beta}{}_4 D_{ij}^{\beta}{}_5 A_{ij}^{\beta}{}_6 \varepsilon_{ij}) \quad (1)$$

Where $Y_i(Y_j)$ indicate GDPs of the exporter(importer) $Pop_i(Pop_j)$ are populations of the exporter(importer), D_{ij} measures the distance between the two country's economic centres, A_{ij} represents other factors aiding or preventing trade between pairs of countries and ε_{ij} is the error term. An alternative formulation of Equation (1) uses GDP per capita income instead of population,

$$X_{ij} = \gamma_0 Y_i^{\gamma_1} Y_j^{\gamma_2} Y_i Pop_i^{\gamma_3} Y_j Pop_j^{\gamma_4} D_{ij}^{\gamma_5} A_{ij}^{\gamma_6} \varepsilon_{ij} \quad (2)$$

Where $Y_iPop_i(Y_jPop_j)$ are the exporter(importer) GDP per capita, Equation (1) and Equation (2) are equivalent and the coefficients are expresses as:

$\beta_3=-\gamma_3$, $\beta_4=-\gamma_4$, $\beta_1=\gamma_1+\gamma_4$, $\beta_2=\gamma_2+\gamma_4$

For estimation purposes Equation (1) in loglinear form expressed for a single year is expressed as,

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln(Y_i Y_j) + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j) + \beta_3 \ln D_{ij} + \beta_4 Lang_{ij} + \beta_5 Cont_{ij} + \beta_6 FTA_{ij} + \beta_7 Landl_{ij} + \beta_8 \ln(Area_i Area_j) + \mu CU_{ij} + \varepsilon_{ij} \quad (3)$$

The estimation of the gravity model in a panel data framework with individual effects for each trading pair is given by,

$$\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j)_t + \beta_3 \ln D_{ij} + \beta_4 Lang_{ij} + \beta_5 ComL_{ij} + \beta_6 FTA_{ijt} + \beta_7 Landl_{ij} + \beta_8 \ln(Area_i Area_j) + \mu CU_{ijt} + \varepsilon_{ijt} \quad (4)$$

Where i and j denote countries, t denotes time, and the variables are defined as:

- X_{ijt} denotes the average value of real bilateral trade between i and j at time t,
- Y is real GDP,
- Pop is population,
- D is the distance between i and j,
- Lang is a binary variable which is unity if i and j have a common language,
- ComL is a binary variable which is unity if i and j share a land border,
- FTA is a binary variable which is unity if i and j belong to the same regional trade agreement,
- Landl is a binary which is unity if either i or j is landlocked,
- Area is the land mass of the country,
- CU is a binary variable which is unity if i and j use the same currency at time t,
- β is a vector of nuisance coefficients, and

• εij represents the myriad of other influences on bilateral exports, assumed to be well behaved.

The coefficient of interest to us is μ, the effect of a currency union on trade. I followed the norm in the literature by using ordinary least squares (OLS). However, if the error term of the regression is heteroscedastic the parameters estimated by OLS can be severely biased. Equation (4) estimates the effect of a currency union on regional trade in between SADC member country pairs. The model was augmented from the traditional version by omitting some left-side variables that account for a country's colony or coloniser status because the DOT data being used is from 2000 to 2017 which is post the colonial era of all the SADC member countries. Bilateral trade flows are determined by the variables on the right side of the gravity equation. This gives a clear direction of causality that runs from income and distance to trade.

4.5 Reliability, Validity and Limitations

When employing the gravity model to estimate trade flows, several methodological issues arise that need to be taken into consideration. These issues are derived from various critiques of the estimation of the gravity equation and include the critiques by Baldwin (2005), as well as the critique on the correct functional form of the gravity equation pointed out by Silva and Tenreyro (2006). In as far as these critiques relate to the analysis presented in this dissertation, I discussed my attempts to address them through reliability and validity checks of the estimated results. First, because establishing a currency union or choosing to stay in a currency union may be an endogenous choice, reverse causality might explain some of the large trade-creating effects of a currency union. To solve the potential endogeneity problem, use of appropriate variables when estimating the gravity equation could be a solution. "However, identifying the appropriate variables for a currency union could prove to be a difficult undertaking, which is further complicated by the fact that currency union membership is proxied by a dummy variable" (Silva and Tenreyro, 2006). Nevertheless, attempts by Alesina and Barro (2002) to address the endogeneity problem using an appropriate variable based on importer-exporter relationship have shown that the effect of currency union on trade remains significant even after accounting for this potential endogeneity. In addition, Rose and van Wincoop (2001) "argue that reverse causality also does not explain away the findings; there is little evidence in the political science literature that countries join currency unions to increase trade, and instrumental variables only increase the impact of currency unions on trade." In my analysis I chose to treat currency unions as an exogenous variable with respect to trade. Second, is the issue of the omitted variables

bias stemming from the correlation of any pro-trade omitted variables with the currency union dummy. This has been labelled as the "gold medal mistake" in Baldwin's (2005) critique. Research following Rose (2000) attempts to control for this bias by introducing country-specific estimators in the model, both in the context of cross-section and panel data estimations. In cross-section analysis, country fixed effects (using country-specific dummy variables) can be introduced to account for Anderson and van Wincoop's (2003) "multilateral resistance" factor, according to which trade between two countries does not only depend on the characteristics of the countries but also on inherent barriers between them. However, given that there was a time- series element to the potential bias that is not eliminated with this procedure, I employed a panel data OLS effects procedure that adds country specific effects to the equation, and thus exploits the time-series dimension of the data around country averages.

Finally, there are several issues relating to model misspecification. These include (1) the combining both exports and imports to represent the bilateral trade dependent variable (the "silver medal mistake" of Baldwin (2006); (2) possible nonlinear effects entering the gravity equation; and (3) the treatment of zero-trade observations in the sample. I attempted to address all these issues in my validity checks. On the derivation of the bilateral trade estimations, Nitsch (2002) argues that although theory supports the use of bilateral exports as the dependent variable, using bilateral trade as the dependent variable without taking into consideration both imports and exports can seriously bias the results. I addressed this critique by taking the dependent variable as the sum of the logarithms of exports and imports in addition to the logarithm of the sums, and re-estimating Equation (4). To address the possibility of nonlinear effects operating in gravity equation estimations (for example, due to sample non-homogeneity), I added quadratic terms for both output and output per capita as in Glick and Rose (2002). “The issue of zero-trade observations arises because many observations in bilateral trade data sets appear as zeros either because some pairs of countries did not trade, or because of rounding errors and missing observations” (Olsson, 2013). Using the log-linear form of the gravity equation as in Equation (4) implies including only those observations for which the dependent variable is positive. Given that the value of trade flows between some pairs of countries (mostly pairs of economically small countries) tends to be zero, this may lead to a sample selection problem. The inclusion of zero observations may result in inconsistent estimators when OLS are used. It is suggested by Silva and Tenreyro (2006) to use the Tobit estimation method to account for the censored nature of the dependent variable of the model and to also apply the pseudo-maximum likelihood (PML) approach. This approach takes the

real value of trade as the dependent variable and includes zero observations. An additional advantage of using the PML approach is that it may have a superior functional form than the log-linear gravity model. This is because, as noted by Silva and Tenreyro (2006), “Jensen's inequality can have important implications for log-linear models in the presence of heteroscedasticity: if the error term is heteroscedastic with the variance depending on the regressors, then the parameters estimated by OLS can be severely biased”. I checked the sensitivity of my results to the inclusion of zero-trade observations by perturbing the gravity equation estimation using 2 different specifications. The first specification includes all zero trade observations and the second specification substitutes the zero observations with a value of one.

CHAPTER 5. DISCUSSION AND RESULTS

5.1 Introduction

In this section of the dissertation the results from the econometric equations and the summary of descriptive statistics will be presented and analysed. The method that was adopted for the regressions analysis is OLS. When executing the equations in Eviews, different specifications were used to establish the most robust and accurate results for comparison. Particularly, I conducted sensitivity checks of the specifications by estimating the dependent variable as the average of the logarithm of exports and imports (rather than the logarithm of the average) and by assuming a value of one on the country-pairs that have zero trade flow values. The different outcomes resulting from the different specifications will be presented and discussed separately in this section. For all the estimations, conventional significance levels of 10%, 5% and 1% were used. After estimating the regression model, it was important to determine the validity of classical OLS assumptions before conducting inference. If violations of these assumptions are detected, subsequent inferential procedures may be invalid resulting in biased conclusions. In constructing my regression model, I assumed that the relationship between the explanatory variables and the dependent variables were linear in their coefficients and that the errors were independent and evenly distributed normal random variables with mean zero and constant variance (Gujarati & Porter, 2009). It was therefore crucial to perform appropriate model diagnostic tests. Following these tests, the appropriate estimation method was used to estimate the gravity model.

The Hausman test was applied to determine which estimation techniques would be ideal for the further estimation of the gravity model. The Hausman specification test compares the fixed versus random effects under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model. If correlated and the null hypothesis is rejected, adopting a random effect model procedure biases the results, therefore a fixed-effects model would be preferable (Glick and Rose, 2001). Diagnostic tests for heteroscedasticity, autocorrelation and multicollinearity were performed in specifying and estimating the model and appropriate remedies were applied, where possible. The following section provides an analysis of the descriptive statistics of the sample.

5.2 Analysis of Descriptive Statistics

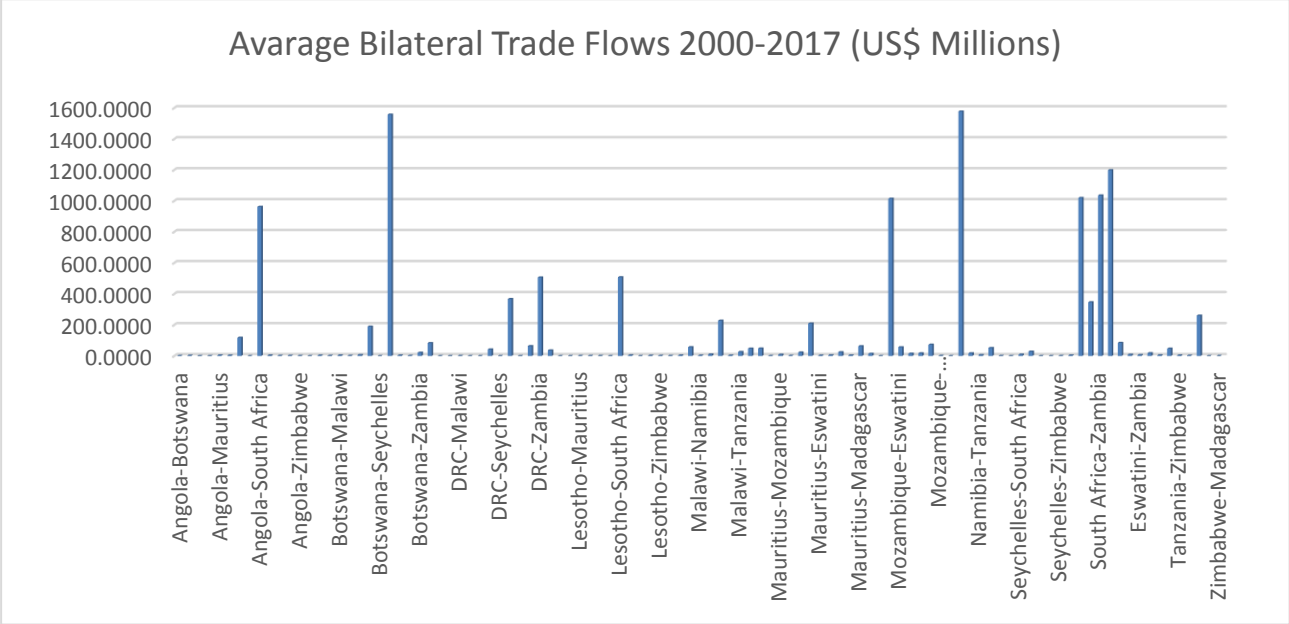
Table 3. Descriptive Statistics

Variable	Whole Sample					Common Currency Pairs				
	Obs	Mean	S.D	Min	Max	Obs	Mean	S.D	Min	Max
Average Bilateral Trade	1890	116.2	366.3	0	2919	198	402.7	683.5	0	2919
Product of Real GDP	1890	805.3	3170	0.514	45822	198	924.4	1966	1.11	10288
Product of Real GDP/Capita	1890	9.27	18.72	0.023	163.5	198	7.27	8.7	0.21	44.68
Product of Land Mass Area	105	400	604.1	0.001	2923	12	195.2	312.4	0.53	1005
Distance	105	2103	1135	152.5	4910	12	988.2	438	299.2	1590
Regional Trade Agreement	1890	0.926	0.261	0	1	198	1	0	1	1
Common Language	105	0.619	0.487	0	1	12	1	0	1	1
Common Land Border	105	0.231	0.423	0	1	12	0.455	0.522	0	1
Landlocked	105	0.644	0.481	0	1	12	0.909	0.302	0	1

Table 3 shows some descriptive statistics for both the whole sample of available observations and for currency union members. The number of available observations is tabulated along with the mean and standard deviation. There are also statistics on minimum and maximum values of the respective samples. To assess non- random selection, one can also compare the means of the relevant variables across the groups of country pairs with and without a common currency. Appendix Table 4 gives a summary of the common currency areas in SADC namely, the CMA and Zimbabwe's multicurrency regime that includes the Rand and the Pula. Appendix Table 11 is a summary of the data statistics including the observed 12 common currency pairs in the SADC region. This common currency pair subgroup makes up 11.4% of 105 country pairs in SADC. Table 3 indicates that members of currency unions tended to be smaller and geographically closer than non-currency union members.; they more often share a language, borders and a regional trade area. SADC common currency areas are associated with higher incomes relative to the whole sample as shown by the slightly higher mean of the product of real GDPs of country pairs. However, the respective mean values for product of the real GDP per capita indicate that members of common currency areas have a higher standard of living than the rest of the sample. This indicates that, in all these respects, country pairs that do and do not use the same currency do form distinct groups. It is also interesting to note that common currency-pairs have significantly higher mean bilateral trade which supports the hypothesis of currency unions increases the trade flows between a trading pair.

Figure 3 shows the average bilateral trade flows between 105 SADC member state country-pairs for the years 2000 to 2017. It is immediately evident that South Africa's bilateral trade flows with other SADC member countries are higher as compared to other country-pairs. The highest ranking average bilateral trade flows for the period under observation being between South Africa and the other common currency member countries except for Angola and Botswana. This shows that the domestic currency peg to the Rand of the CMA countries has had a positive impact on the trade volumes between South Africa and these countries.

Figure 3. Average Bilateral Trade Flows



5.3 Tests of the Model

5.3.1 Pooled, Fixed and Random Effects Estimations – The Hausman Test

In estimating the gravity model as prescribed by Glick and Rose (2001), unbalanced panel data have been used which include individual effects in the regression. It followed that a decision had to be made on whether these individual effects are treated as fixed or random. A core assumption in random effects estimation is that the random effects are uncorrelated with the explanatory variables (Olsson, 2013). The Hausman test was employed to test this assumption through a comparison of the fixed and random effects estimation of the coefficients. For the Hausman test to be conducted, first a random effects panel regression is estimated (results are presented in Table 4 below). The test indicates whether the specific effects are correlated or not with the explanatory variables. According to Adefemi (2017) the specifications for the determination of the right model between the fixed and random effects model are as follows;

Hypothesis:

Null hypothesis(H_0) = Random effects model is appropriate
Alternative hypothesis(H_1) = Fixed effects model is appropriate

Decision Criterion: Reject H_0 if probability value is less than 5%, fail to reject the H_0 if probability value is greater than 5%.

The results of the Hausman test statistics as shown in Table 4 suggest that the Fixed Effects Model (FEM) is preferred over the Random Effects Model (REM) because of the high Chi-squared statistic value and a low *p*-value which supports the rejection of the null hypothesis that the REM is appropriate. In following Rose (2000), the conventional OLS method is preferred over the FEM. The estimated results of the average bilateral trade between the SADC member states country-pairs using equation (4) are given in Table 4. The first column shows the results for the FEM. Results from REM and pooled OLS estimation are reported in column 2 and 3 respectively. The gravity model works well in a number of different dimensions. The model fits the data well, explaining over half of the variation in bilateral trade flows for both the FEM and the REM. Few of the effects vary much over time, so using OLS simply improves the precision of the coefficient estimates. The gravity coefficients are mostly economically and statistically significant with sensible interpretations except for the coefficients for the Currency Union, Landlocked and the Log Product Real GDP per Capita variables. For instance, economically larger and richer countries trade more and more distant countries and landlocked countries trade less. A common language, land border and membership in a regional trade agreement encourage trade. The currency union coefficient is not intuitively signed and is also not statistically indistinguishable from zero.

Table 4. OLS, Random and Fixed Effect Panel Regression Estimation

	Fixed Effects	**Random Effects**	**OLS (Pooled)**
Currency Union	-0.337877	-0.573281**	-0.342254
	(0.21227)	(0.238187)	(0.212871)
Common Language	0.835560***	1.065243**	0.900926***
	(0.132508)	(0.474261)	(0.13247)
Landlocked	-0.024302	-0.620184	-0.172218
	(0.135501)	(0.459393)	(0.13247)
Common Land Border	1.771590***	1.771838***	1.812496***

	(0.165902)	(0.621949)	(0.166356)
RTA	0.418979*	0.117529	0.408918*
	(0.226951)	(0.144635)	(0.219823)
Log Product Real GDP	1.159118***	0.467443***	1.036528***
	(0.051118)	(0.070449)	(0.045613)
Log Product Real GDP/Capita	0.042669	0.381479***	0.020116
	(0.044035)	(0.086249)	(0.043816)
Log Distance	-1.680351***	-1.991845***	-1.674521***
	(0.102568)	(0.368911)	(0.102964)
Log Product Area	-0.250228***	0.104859	-0.212361***
	(0.03113)	(0.084891)	(0.030412)
Observations	1786	1786	1786
R^2	0.566784	0.316867	0.558851
Hausman Test (Chi.Sq Statistic)		18.339215	
Hausman Test (*p*-value)		0.0011	

Note: Dependent variable X_{ijt} represents average bilateral trade flows between country i and j.

Annual data for 15 countries from 2000 to 2017 constituting 105 country-pairs.

Standard errors in parentheses, *,**,*** denote significance at the 10, 5, and 1 percent levels respectively.

5.3.2 Test for Multicollinearity

According to Tri Do (2006) multicollinearity occurs when independent variables in a regression model are correlated. When independent variables are correlated it indicates that changes in one variable are associated with shifts in another. To check for the presence of multicollinearity in the model, the correlation matrix (Appendix Table 1) has been used to assess the level of correlation between the explanatory variables. Most of the values of the correlation coefficients between explanatory variables are lower than 0.50, an indication of the absence of severe multicollinearity except for GDP and Bilateral Trade which are correlated (r= 0.519). To validate the results of the correlation matrix, the variance inflation factors (VIF) for the variable were assessed and presented in Appendix Table 2. The VIF for Log (product of real GDP) and Log (product of real GDP per Capita) are large at 2.768130 and 2.204603 respectively. To correct for multicollinearity, I removed the violating variable in this case Log (product of real GDP) was removed from the model. Appendix Table 2 shows the resulting VIFs after removing GDP and these are satisfactory as all of them are between 1 and 2.

5.3.3 Test for Heteroscedasticity

In conducting the panel data analysis for the bilateral trade model an underlying assumption of regression analysis is homoscedasticity. This means that the variances of error are homogenous

and that the errors of the model are identically distributed. If this assumption is violated, then the variance of errors or the model is not the same for all observations and any estimation of their variance becomes unreliable. To test for heteroscedasticity (which is the absence of homoscedasticity), first scatter graphs of the residuals squared plotted against the explanatory variables were assessed. An evident pattern with all the scatter plots indicated that heteroscedasticity was present (Appendix Figure 1). To further confirm the presence of heteroscedasticity the histogram normality test (Appendix Figure 2) was utilised and the resulting Jarque-Bera statistic and the *p*-value of zero indicated that the model's residual errors were not normally distributed. This therefore means the model violated the assumption of homoscedasticity. To remedy the heteroscedasticity, the standard errors were white cross-section adjusted for the estimation of the pooled OLS regression. This technique effectively improves the estimation of the standard errors and estimators without changing the estimate of the slope coefficients as shown by the results in column 1 of Table 5 below.

5.3.4 Test for Autocorrelation

The term autocorrelation can be defined as correlation between members of observations in time-series data or cross-sectional data. The absence of autocorrelation in disturbances u_i can be expressed as;

$$E(u_i,u_j) = 0 \; i \neq j$$

That is, the disturbance term relating to an observation is not related to or influenced by the disturbance term of any other observation. The consequences of autocorrelation are that the estimated variances of OLS estimators will be biased. This gives the appearance that a coefficient is statistically significantly different from zero, whereas in fact that might not be the case. The Durbin- Watson *d* statistic is widely used to detect the presence of autocorrelation in regression models. If a computed *d* value is closer to zero, there is evidence of positive autocorrelation, but if closer to 4 there is evidence of negative autocorrelation. The desired *d* value is one which is closer to 2 as this favour the absence of autocorrelation (Gujarati & Porter, 2009). The pooled OLS regression analysis of the gravity model results in a *d* statistic of 0.208511 which indicates the presence of positive serial correlation in the residuals. To remedy the autocorrelation, the regression equation was transformed to a generalized difference equation of the first order AR (1) first-order serial correlation which resulted in a computed *d*

value of 2.248399 which means serial correlation has been remedied as shown in column 2 of Table 5.

Table 5. White Corrected and First Order Autoregression Estimations

	White's Corrected Regression Estimation	White's Corrected First-Order Auto regression Estimation
Variable	**Coefficient**	**Coefficient**
C	11.03996***	13.43855***
	(0.299817)	(2.926259)
Currency Union	-0.315411**	0.437614
	(0.146550)	(0.294597)
Common Language	0.913222***	0.653205
	(0.065179)	(0.63983)
Landlocked	-0.937272***	-1.125715**
	(0.071305)	(0.559738)
Common Land Border	1.909259***	1.997900*
	(0.063162)	(0.485936)
RTA	0.798477***	-0.340131***
	(0.156671)	(0.171067)
Log Product Real GDP/Capita	0.604425***	0.347122***
	(0.040023)	(0.117974)
Log Distance	-1.693062***	-1.658037***
	(0.046186)	(0.382675)
Log Product Area	0.284681***	0.173485***
	(0.013668)	(0.076408)
AR (1)		0.883803***
		(0.013426)
Observations	1786	1663
R-squared	0.431211	0.886003
Adjusted R-squared	0.428651	0.885382
F-statistic	168.3978	1427.485
Prob(F-statistic)	0.000000	0.000000
Durbin-Watson stat	0.208511	2.521604

Notes: Dependent variable Xijt represents average bilateral trade flows between country i and j.

Annual data for 15 countries from 2000 to 2017 constituting 105 country-pairs.

Standard errors in parentheses, *,**,*** denote significance at the 10, 5, and 1 percent levels respectively.

Column 1 represents the White's corrected regression estimation after dropping the Log Product Real GDP.

Column 2 represents the White's corrected, first order autoregression estimation after dropping the Log Product Real GDP.

5.4 Results

Since multicollinearity was found among the explanatory variables, the model in equation (4) is estimated taking all variables except for the Log Product Real GDP variable for all 105 country-pairs over the 18 years under study. The estimation uses White's heteroscedasticity-corrected covariance matrix estimator, which is considered to be a robust method. This focuses on improving the estimation of the standard errors without changing the estimates of the slope coefficients. Table 5 (column 1) reports the White's heteroscedasticity corrected model regression result after removing the Log Product Real GDP variable to correct for multicollinearity. The estimation results presented in column 1 of Table 5 show that all the coefficients are economically and statistically significant. The currency union dummy variable has an unexpected sign indicating that participation in a currency union has the effect of reducing trade between a trading pair by a factor of -0.315. The reported R-squared and F-statistics of the regression output however, imply that the entire model explains only 43% of the variations in the trade flow. The R-square is 0.431 and F-statistics is highly significant with $p = 0.00$.

The estimation results of bilateral trade between the member countries of the SADC are given in Table 5 (column 2). The results shown are corrected for multicollinearity by dropping the Log Product Real GDP variable, autocorrected by doing AR (1) differencing and are White's heteroscedasticity corrected pooled OLS which is suggested by Khan and Hossain (2010). All the estimated coefficients have all the expected signs theoretically. It is expected that the effect of distance which is a proxy for transportation costs, between two trading countries on trade balances is negative. The further apart the two trading countries are the less the expected trade balances. The product for GDP per capita in time t is used as a measure of market size, the larger the market the more it trades so therefore market size is expected to have a positive relationship with trade. Three of the five dummy variables namely the currency union dummy variable, the common language dummy variable and the shared land border dummy variable are all expected to have a positive relationship with trade. This is because these shared attributes improve relations between two trading countries and hence by extension are expected to encourage trade. The currency union dummy variable has a positive sign as expected, indicating that participation in a currency union has the effect of reducing trade between a trading pair although the coefficient is not statistically significant. The reported R-squared and F-statistics of the regression output however, imply that the entire model explains approximately 87% of the variations in the trade flow. The R-square is 0.886 and F-statistics is highly significant with

p = 0. 00. The product of the country mass areas of the trading pair is expected to be positively related to trade because the larger the area covered by a country the higher the population and the expected propensity to trade. Lastly the landlocked dummy variable and the regional trade agreement dummy variable are expected to have a negative sign. Appendix Figure 3 is a graphic representation of the relationships between the respective explanatory variables and the dependent variable and the graphs support the expected theoretical relationship between the dependent variable and the respective explanatory variables.

5.5 Regression Model Sensitivity Analysis

In their paper critiquing the available literature on currency union trade effects, Baldwin and Taglioni (2007) identified what they termed "the silver medal mistake" in estimating gravity models. Most gravity model estimations, according to Baldwin and Taglioni (2007), make the mistake of using the arithmetic mean of uni-directional bilateral trade flows instead of using geometric mean and by so doing mistake the log of the average for the average of the logs[8]. This mistake tends to produce biased results. As posited by Anderson (2011) another challenge when estimating regression models is the presence of zero trade observation between trading country pairs that might be an indication of no trade between the countries. Zero trade flows occur between small or distant trading partners which are theoretically expected to trade minimally. This presents a challenge when specifying a log-linear gravity model. Taking logarithms effectively drops zero trade observations from the sample because the log of zero is undefined. Dropping zero observations, however, can lead to biased estimates of the coefficients (Olsson, 2013).

Three main approaches traditionally are used to address the zero-trade flow problem, and these include the Ad hoc solutions, the Poisson model and the Heckman's sample selection model. Alternatively, under the Ad hoc solution, zero values may be substituted by a small constant so that the log-linear model can be estimated without dropping zero trade country-pairs from the sample. Earlier studies by Raballand (2003) and Wang and Winters (1991) had similar problems which were addressed by modifying the model specification by replacing all zero-trade flow with a minimum value of one given that the log of one is defined as zero and therefore

[8] The arithmetic mean is calculated by adding up all the numbers in a data set and dividing the results by the total number of data points whereas the geometric mean of a data set is calculated by multiplying the numbers in the data set and taking the nth root of the result, where "n" is the total number of data points in the set.

all relevant observations are included in the sample. This was considered by Martin and Pham (2008) to be a more plausible approach than dropping some observations all together.

In Table 6, I provided some sensitivity analysis. I perturbed my basic methodology in a number of different ways, and tabulate estimates of the coefficients of the explanatory variables using OLS estimators. Table 6 shows the results for four variations of the basic gravity equation using the full sample of SADC member countries. Column 1 shows the estimates when the arithmetic mean is used to calculate the average bilateral flows between a country-pair and utilises zeros to represent instances where trade statistics between country-pairs are not available. Column 2 also utilises the arithmetic mean method to calculate average bilateral trade flow between trading partners but unlike the specifications in column 1, zero trade statistics are substituted with a value of one. Column 3 and 4 use the geometric mean method (which tends to produce higher coefficients parameters) to calculate average bilateral trade flows with column 3 utilising ones to represent no trade statistics and column 4 utilising zeros instead. To determine the specification which yielded the least biased and most robust set of results, the resulting estimations of each specification were analysed. The selection is based on which specification produced the expected signs for all the variables, resulted in significant *p*-values for the regression coefficients and produced the highest R^2 statistic also known as the coefficient of determination which is a goodness-of-fit measure.

The estimations for the 4 specifications show that the intercept coefficient for the specifications using values of one for zero trade flows, that is specifications (1) and (3), were significantly higher than the specifications retaining zeros for zero trade flows. Most of the signs of the explanatory variables are as expected except for the estimations for specification (1) and (2) using the arithmetic mean to calculate average bilateral trade. The sign for the currency union dummy variable coefficients under these specifications were found to be negative which contradicts the theoretical expectation. All four specifications result in statistically insignificant currency union dummy variable coefficients. This further validates that the data provides little or no evidence that the null hypothesis is false. Specification (1) and (2) also exhibited fewer significant variables as compared to specification (3) and (4) which each have eight out of ten coefficients being statistically significant. An interesting outcome of the regression estimations is the sign for the regional trade agreement dummy variable generated under specifications (3) and (4) which seems to indicate that membership in SADC tends to have a negative impact on average bilateral trade flows between two trading countries. Overall, the coefficient of

determination statistic is highest for specification (4) relative to the other specifications which means that approximately 88.9% of the variance in the dependent variable is explained collectively by the explanatory variables. Given the above factors specification (4) embodies the most robust and least biased regression estimation for equation (4).

Table 6. Summary of variable coefficients and p-values

	Specification (1)	**Specification (2)**	**Specification (3)**	**Specification (4)**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
C	20.36417***	8.685841**	20.66073***	13.43855***
	(4.973126)	(4.139918)	(3.062659)	(2.926259)
Currency Union	-0.424984	-0.31053	0.164412	0.437614
	(0.384802)	(0.276735)	(0.398028)	(0.294597)
Common Language	1.973571***	0.642291	1.14436	0.653205
	(0.744857)	(0.830262)	(0.762303)	(0.639830)
Landlocked	-2.369554***	-1.189506*	-1.141872*	-1.125715**
	(0.865656)	(0.628287)	(0.669339)	(0.559738)
Common Land Border	2.243246**	2.362069***	1.790331***	1.997900***
	(0.943744)	(0.723010)	(0.580815)	(0.485936)
RTA	0.163622	0.151386	-0.383083***	-0.340131**
	(0.582586)	(0.179113)	(0.079347)	(0.171067)
Log Product Real GDP/Capita	0.660932	0.375023***	0.544574***	0.347122***
	(0.423656)	(0.103493)	(0.137188)	(0.117974)
Log Distance	-3.245593***	-1.143268***	-2.893825***	-1.658037***
	(0.685966)	(0.505788)	(0.436495)	(0.382675)
Log Product Area	0.543893***	0.243702***	0.345700***	0.173485***
	(0.14542)	(0.088959)	(0.114651)	(0.076408)
AR (1)	0.862196***	0.887939***	0.855751***	0.883803***
	(0.025927)	(0.028452)	(0.021163)	(0.013426)
Observations	1785	1058	1785	1663
R-squared	0.851035	0.869968	0.847493	0.886003
Adjusted R-squared	0.850279	0.86885	0.846719	0.885382
F-statistic	1126.094	778.3175	1095.36	1427.485
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000
Durbin-Watson stat	2.471833	2.104052	2.418143	2.521604

Notes: Annual data for 15 countries for the period 2000 to 2017, 105 country pairs represented.

Dependent variable Xijt represents average bilateral trade flows between country i and j.

Standard errors in parentheses. *, ** and *** denote significance at the 10, 5 and 1 percent levels respectively.

Specification (1) Substitutes zero trade values with 1 and the arithmetic mean is used to calculate average bilateral trade.

Specification (2) Retains zero trade flow values and the arithmetic mean is used to calculate average bilateral trade.

Specification (3) Substitutes zero trade values with 1 and the geometric mean is used to calculate average bilateral trade.
Specification (4) Retains zero trade flow values, and the geometric mean is used to calculate average bilateral trade.

5.6 Discussion

The lack of statistical significance of the common currency dummy variable as reported in Table 6 specification (4), is highly likely due to the presence of a high number of zero trade values between trading partners in the currency union sample. These zero trade values are motivated by the small market sizes that are characteristic of most African countries and the lack of capacity to produce enough for the export market. As highlighted by Jefferis (2007) with a few exceptions, intraregional trade is relatively unimportant as a proportion of most REC's total exports. SADC member country exports to other countries within the region constitute about 10 percent of the region's total exports. This number is very low when compared to intra-European Union trade, for instance, which amounts to over 50 percent of EU exports. Another major drawback to regional integration (RI) in Africa is that it tends to benefit the stronger members only and as a result even a common currency would not have the expected positive impact on trade flows. This argument as discussed by (Alves, Draper, and Khumalo, 2009) holds that when a cluster of countries in an RI arrangement contains economies performing well above the global average the forces of convergence will prevail. In other words, the weaker members will 'catch up' as resources flow from their countries to the economically stronger countries. But when a group contains no globally strong economies, resources will flow from the weakest in the group to the strongest, where it is relatively cheaper and easier to do business, and where there are better-developed connections to global export markets. On the other hand, when a group contains no globally strong economies, the relatively stronger economies will grow at the expense of the weaker members in the RI arrangement. The latter situation is consistent with SADC which has South Africa as the stronger economy among all the member states and hence the country records significant exports to these other weaker member economies relative to exports between other member countries.

CHAPTER 6. CONCLUSION AND RECOMMENDATIONS

The empirical results of Rose (2000) and other authors that membership in a currency union might increase trade by a factor of two or more have been used to promote the creation of new currency unions, following the example of the Eurozone. Given the small size of Africa's trade, the formation of currency unions seems a logical way to boost trade and to improve monetary policy. The main purpose of this dissertation was to investigate the potential impact of a hypothetical currency union for all SADC member countries on the level of trade between the 15-member states. In this respect a gravity model was estimated with panel data using pooled OLS, random and fixed effect estimations covering the 18-year period 2000 to 2017. In general, within these three formulations of gravity models, the estimation with pooled OLS effects performed better than both the REM and the FEM, since the estimation results in pooled OLS effects provided a more satisfactory outcome of the estimated economic factors based on the theoretical expectations. The variable of interest that is the currency union dummy, however, was found to not be statistically significantly different from zero holding all other variables constant. Therefore, there is no evidence to suggest that a currency union for SADC members will result in increased bilateral trade flows in the region. Other results indicate that the bilateral trade volume between the SADC member countries are driven by country land mass area, economic size and shared land borders. Distance, landlocked status and being party to a regional trade agreement were found to have a negative impact on the trade volumes between member countries.

Income differentials between SADC member states are very wide, with GDP per Capita of the richest SADC member being 37 times that of the poorest in the region. Within the CMA, the equivalent gap in GDP per Capita between the richest country Seychelles and the poorest Malawi is only four times. Another deterrent of the effectiveness of SADC monetary union are the low levels of intraregional trade. A successful regional trade agreement while beneficial, would not, however, be sufficient for a viable monetary union. Transformation into a full customs union would have to follow for the establishment of a single market for goods and services, capital and labour among participating countries. Regional economic communities will, therefore, need to facilitate free labour and capital mobility. Concerning capital movement controls, most SADC members now accept in principle, that the free flow of capital within SADC is desirable and feasible. However, free labour mobility is difficult to attain, stemming from concerns that severe income disparities inside the region might cause unsustainable

migration among countries. The issue of economic union is unlikely to be feasible, at least not across all SADC member countries, for the foreseeable future. One of the most contentious issues facing a potential monetary union pertains to the need for a transfer or reimbursement mechanism. This will help towards convergence among poorer and richer nations via the provision of resource transfers from the latter to the former. This has been an integral element of financial integration within the EU. It may also provide compensation for the tendency of economic activity to gravitate to the centre of a stronger economic area, leaving weaker economies with slower growth. The SACU agreement has a built-in compensation mechanism built into the revenue distribution, which essentially involves transfers from South Africa to Botswana, Lesotho, Namibia and Eswatini. But the same mechanism would be hard to achieve given the larger number of SADC countries, several of which might be a lot poorer than the poorest SACU member and have much larger populations. In addition, it is difficult to envisage South Africa imparting sufficiently sizeable transfers to the rest of SADC that will have a meaningful impact on per capita income levels.

The main conclusion to be drawn from this study is that not one factor affects the bilateral trade flow of a country-pair; instead there are several factors that come into play and collectively they affect trade. An introduction of a currency union as shown by the results has no effect on bilateral trade flow between member countries. The statistics in this dissertation show that trade will increase due to a trading pair's country size and market size. Another factor that also affects the trade flow is a shared land border. A shared border indirectly reduces the costs of transportation and general costs of transacting between two trading countries resulting in an increase in bilateral trade flows. Leaving currency issues aside, African countries can do much to increase trade. This includes infrastructural development, reducing political tensions, and reducing tariff and non-tariff barriers to trade. There is much evidence that transportation costs are higher in Africa than the rest of the world and result from poor infrastructure and civil unrest (Masson, 2006). Efforts should be made to reduce these costs by eliminating customs barriers and investing in infrastructure to facilitate trade.

The results reported in this dissertation are subject to some limitations. One major limitation lies in the fact that my analysis relies on data based on currency union proxies since a SADC currency union does not already exist. Thus, any extrapolation from my results to infer the impact of an actual currency union on trade might lead to less than robust conclusions. Although most of the results are in line with the theoretical expectation, there are still some

recommendations for future studies. For example, specifying more economic variables that may affect the trading volume in the SADC region, including the inflation rate and the real exchange rate between county pairs. In addition, a longer time line that facilitates for long-run analysis would be helpful in deriving more accurate estimations.

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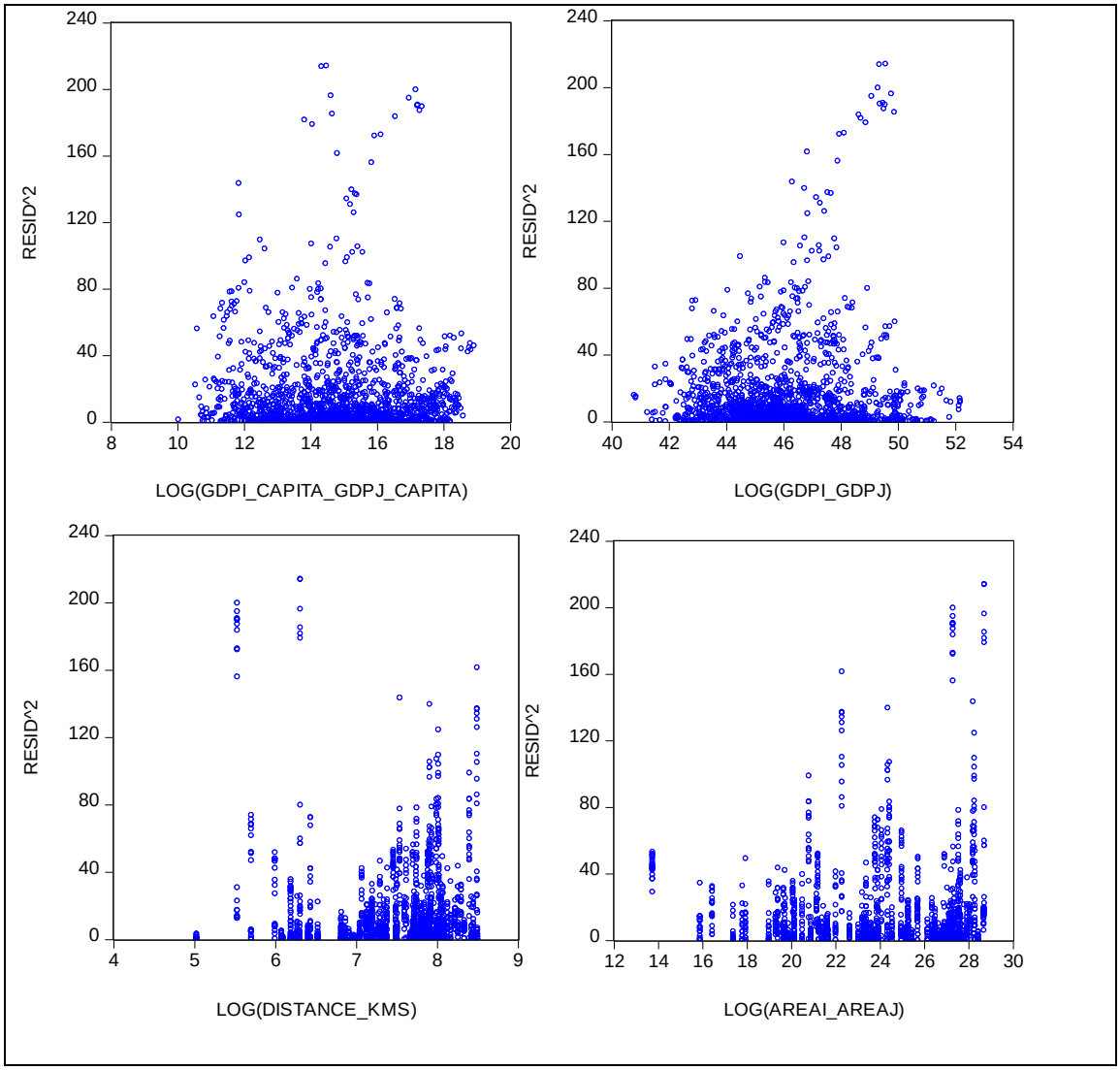
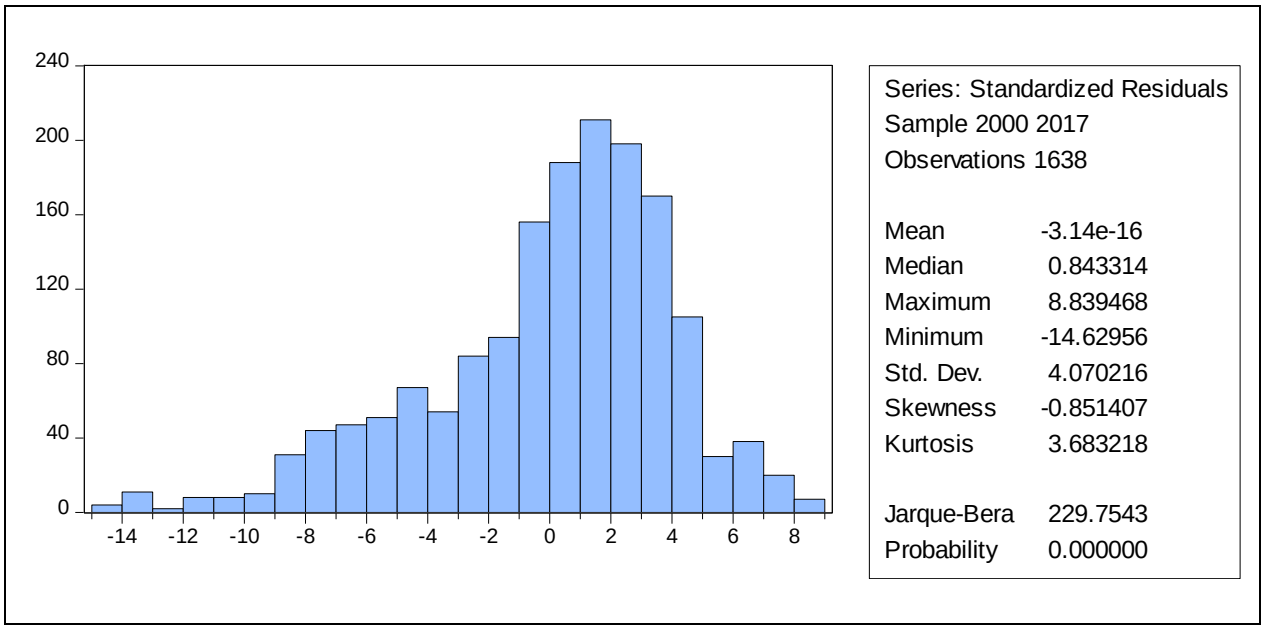
APPENDICES

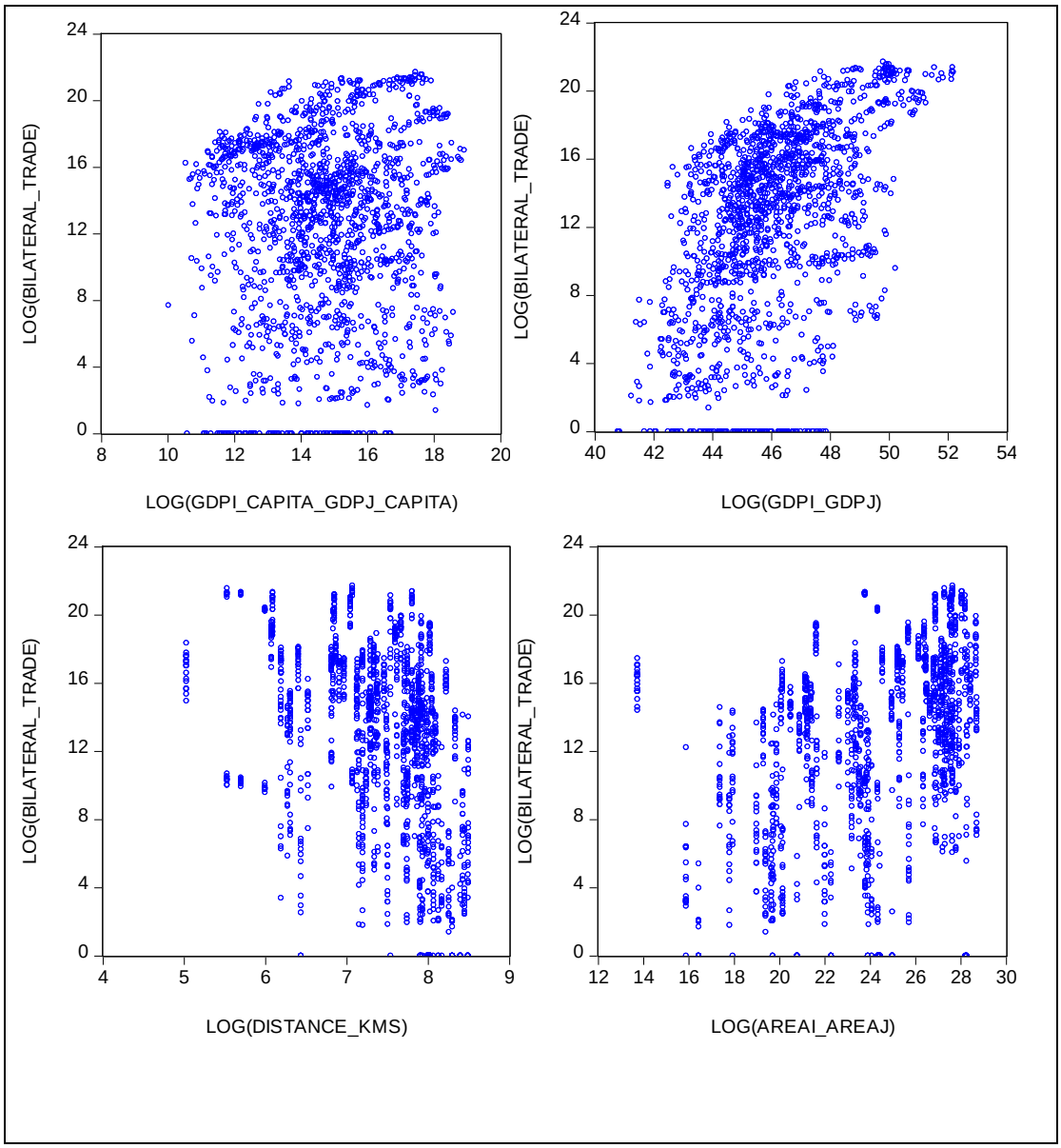
Appendix Figure 1. Residual Plots



Appendix Figure 2. Histogram Normality Test



Appendix Figure 3. Explanatory against Dependent Variable Scatter Graph Plots



Appendix Table 1. Correlation Matrix

	Bilateral Trade	CU Dummy	Common Language	Landlocked	Land Border	RTA	GDP	GDP/Capita	Distance
CU Dummy	0.287682								
Common Language	0.07349	0.2328194							
Landlocked	-0.03547	0.1458329	0.2013563						
Land Border	0.354643	0.1710537	0.1467841	0.1166585					
RTA	0.081624	0.08362	0.2339426	0.1698049	0.15336542				
GDP	0.504108	0.0241767	-0.087848	-0.1964719	0.0256857	0.0489284			
GDP/Capita	0.154909	-0.003925	0.2155063	-0.1186083	-0.0870331	0.1233492	0.0854951		
Distance	-0.271083	-0.305258	-0.093152	-0.3866948	-0.4931914	-0.033117	-0.01912	0.2447815	
Area	0.216102	-0.1031	-0.242252	-0.3744869	0.27356283	0.0244829	0.324178	-0.174006	-0.051486

Appendix Table 2. Variance Inflation Factors

	Variance Inflation Factors with original variables			Variance Inflation Factors after dropping the Real GDP variable		
	Coefficient	**Uncentered**	**Centred**	**Coefficient**	**Uncentered**	**Centred**
Variable	Variance	VIF	VIF	Variance	VIF	VIF
C	0.709762	242.3838	NA	0.896861	237.2703	NA
Currency Union	0.045060	1.318241	1.205313	0.058163	1.318193	1.205268
Common Language	0.017539	3.786156	1.392780	0.022639	3.786093	1.392757
Landlocked	0.017541	3.897461	1.361711	0.021187	3.646729	1.274109
Common Land Border	0.027631	2.277136	1.727614	0.035644	2.275619	1.726464
RTA	0.048289	15.21637	1.175733	0.061955	15.12422	1.168613
Log Product Real GDP	0.002073	18.00840	2.768130			
Log Product Real GDP/Capita	0.001918	2.616542	2.204603	0.001625	1.717467	1.447075
Log Distance	0.010588	200.9851	1.717595	0.013666	200.9731	1.717492
Log Product Area	0.000924	7.662593	3.532731	0.000577	3.706399	1.708783

Appendix Table 3. Definition of Variables

Variable Name		Definition
Dependent Variable		
Log(Average Bilateral Trade)	*Ln(Xijt)*	The logarithm of the average value of real bilateral trade between i and j at time t
Explanatory Variables		
Log(Product of Real GDP)	*Ln(YiYj)t*	The logarithm of the product of the real GDPs of i and j at time t
Log(Product of Real GDP/Capita)	*Ln(YiYj/PopiPopj)t*	The logarithm of the product of the real GDPs per Capita of i and j at time t
Log(Product of Land Area)	*Ln(AreaiAreaj)*	The logarithm of the product of the land mass area of i and j
Log(Distance)	*Ln(Dij)*	The logarithm of the distance between i and j
Dummy Variables		
Currency Union	*CUij*	Is a binary variable which is unity if i and j share a common currency
Common Language	*Langij*	Is a binary variable which is unity if iand j share a language
Landlocked	*Landlij*	Is a binary variable which is unity if either i or j is landlocked
Common Land Border	*ComLij*	Is a binary variable which is unity if i and j share a land border
Regional Trade Agreement	*RTAijt*	Is a binary variable which is unity if i and j where both members of SADC at time t

Appendix Table 4. Common Currency Country-pairs

Currency Union Areas
South Africa
Namibia
Lesotho
Eswatini
Zimbabwe
Botswana
South Africa

Note: Namibia, Lesotho and Eswatini have pegged their respective currencies at 1:1 to the South African rand under the CMA agreement. Zimbabwe adopted a multicurrency regime in 2009 that includes the rand and the pula which are used as legal tender in the country.

Appendix Table 5. Included Variables

Variable	Source	Unit of Measurement
Bilateral Trade Flow	International Monetary Fund	US $
GDP	World Bank	US $
GDP per Capita	World Bank	US $
Area	CIA World Factbook	Kilometres Squared
Common Border	CIA World Factbook	Binominal (0/1)
Common Language	CIA World Factbook	Binominal (0/1)
Landlocked	CIA World Factbook	Binominal (0/1)
RTA	World Trade Organisation	Binominal (0/1)
Bilateral Distance	www.indo.com/distance	Kilometres

Appendix Table 6. Included Countries and their border countries and land area

Country	Country Code	Border Countries	Area Km^2
Angola	a	Democratic Republic of the Congo, Republic of the Congo Namibia, Zambia	1246700
Botswana	b	Namibia, South Africa, Zambia, Zimbabwe	581730
DRC.	c	Angola, Burundi, Central African Republic, Republic of the Congo, Rwanda, South Sudan, Tanzania, Uganda, Zambia	2344858
Lesotho	d	South Africa	30355
Malawi	e	Mozambique, Tanzania, Zambia	118484
Mauritius	f	Island	2040
Mozambique	g	Malawi, South Africa, Eswatini, Tanzania, Zambia, Zimbabwe	799380
Namibia	h	Angola, Botswana, South Africa, Zambia	824292
Seychelles	i	Island	455
South Africa	j	Botswana, Lesotho, Mozambique, Namibia, Eswatini, Zimbabwe	1219090
Eswatini	k	Mozambique, South Africa	17364
Tanzania	l	Burundi, Democratic Republic of the Congo, Kenya, Malawi, Mozambique, Rwanda, Uganda, Zambia	947300
Zambia	m	Angola, Botswana, Democratic Republic of the Congo, Malawi, Mozambique, Namibia, Tanzania, Zimbabwe	752618
Zimbabwe	n	Botswana, Mozambique, South Africa, Zambia	390757
Madagascar	o	Island	582295

Source: World Factbook (2018)

Appendix Table 7. Included Countries and their languages

Country	Languages
Angola	Portuguese, Umbundu, Kikongo, Kimbundu, Chokwe, Nhaneca, Nganguela, Fiote, Kwanhama, Muhumbi and Luvale
Botswana	Setswana, Sekalanga, Shekgalagadi, English, Zezuru/Shona, Sesarwa, Sembukushu and Ndebele
Congo, Dem. Rep.	French, Lingala, Kingwana (a dialect of Kiswahili or Swahili), Kikongo andTshiluba
Lesotho	Sesotho (official) (southern Sotho), English (official), Zulu, Xhosa
Malawi	English, Chichewa, Chinyanja, Chiyao, Chitumbuka, Chilomwe, Chinkhonde, Chingoni, Chisena, Chitonga, Chinyakyusa and Chilambya
Mauritius	Creole, Bhojpuri, French and English,
Mozambique	Emakhuwa, Portuguese, Xichangana, Cisena, Elomwe and Echuwabo,
Namibia	Oshivambo, Nama/Damara, Afrikaans, Otjiherero languages, Kavango languages, Caprivi languages and English
Seychelles	Seychellois Creole, English and French
South Africa	isiZulu, isiXhosa, Afrikaans, English, Sepedi, Setswana, Sesotho, Xitsonga, siSwati, Tshivenda, isiNdebele and sign language
Eswatini	English and siSwati
Tanzania	Kiswahili or Swahili, Kiunguja, English and Arabic
Zambia	Bembe, Nyanja, Tonga, Lozi, Chewa, Nsenga, Tumbuka, Lunda, Kaonde 1.8%, Lala, Lamba, English, Luvale, Mambwe, Namwanga, Lenje and Bisa,
Zimbabwe	Shona, Ndebele, English, Chewa, Chibarwe, Kalanga, Koisan, Nambya, Ndau, Shangani, sign language, Sotho, Tonga, Tswana, Venda, and Xhosa
Madagascar	Malagasy and French

Source: World Factbook (2018)

Appendix Table 8. Real GDP Statistics for the Period 2000-2017 (US$ Billions)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Angola	9.13	8.94	12.50	14.19	19.64	28.23	41.79	60.45	84.18	75.49	82.53	104.12	113.92	124.91	126.73	102.62	95.34	124.21	68.27
Botswana	5.79	5.49	5.44	7.51	8.96	9.93	10.13	10.94	10.95	10.27	12.79	15.68	14.69	14.92	16.25	14.42	15.65	17.41	11.51
DRC	19.09	7.44	8.73	8.94	10.30	11.96	14.45	16.74	19.79	18.65	21.57	25.84	29.31	32.67	35.92	37.92	34.99	37.24	21.75
Lesotho	0.89	0.83	0.78	1.16	1.51	1.68	1.80	1.82	1.87	1.87	2.39	2.79	2.68	2.53	2.61	2.51	2.29	2.64	1.92
Malawi	1.74	1.72	3.50	3.21	3.48	3.66	4.00	4.43	5.32	6.19	6.96	8.00	6.03	5.52	6.05	6.37	5.43	6.30	4.88
Mauritius	4.58	4.54	4.77	5.61	6.39	6.28	7.03	8.15	9.99	9.13	10.00	11.52	11.67	12.13	12.80	11.69	12.23	13.34	8.99
Mozambique	5.02	4.77	5.03	5.60	6.83	7.72	8.31	9.37	11.49	10.91	10.15	13.13	14.53	16.02	16.96	14.80	11.01	12.33	10.22
Namibia	3.91	3.55	3.36	4.93	6.61	7.26	7.98	8.74	8.49	8.88	11.28	12.41	13.02	12.72	12.79	11.77	11.31	13.24	9.01
Seychelles	0.61	0.62	0.70	0.71	0.84	0.92	1.02	1.03	0.97	0.85	0.97	1.07	1.06	1.33	1.34	1.38	1.43	1.49	1.02
South Africa	136.36	121.60	115.75	175.26	228.94	257.67	271.81	299.03	287.10	297.22	375.30	416.88	396.33	366.83	350.90	317.74	295.76	349.42	281.11
Eswatini	1.74	1.54	1.43	2.20	2.77	3.18	3.29	3.47	3.29	3.58	4.44	4.82	4.82	4.56	4.38	4.02	3.72	4.41	3.43
Tanzania	10.19	10.38	10.81	11.66	12.83	16.93	18.61	21.50	27.37	28.57	31.41	33.88	39.09	44.41	48.22	45.62	47.39	52.09	28.39
Zambia	6.69	6.78	6.34	5.73	5.81	5.76	5.44	5.29	4.42	8.62	10.14	12.10	14.24	15.45	15.89	16.30	16.62	17.85	9.97
Zimbabwe	3.60	4.09	4.19	4.90	6.22	8.33	12.76	14.06	17.91	15.33	20.27	23.46	25.50	28.05	27.15	21.15	20.95	25.81	15.76
Madagascar	3.88	4.53	4.40	5.47	4.36	5.04	5.52	7.34	9.41	8.55	8.73	9.89	9.92	10.60	10.67	9.74	10.00	11.50	7.75

Source: “World Development Indicator” World Bank (2018)

Appendix Table 9. Real GDP per Capita Statistics for the Period 2000-2017 (US$)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average
Angola	555.30	526.17	711.18	779.47	1041.09	1443.99	2062.42	2878.84	3868.58	3347.84	3531.42	4299.01	4539.47	4804.63	4707.58	3683.55	3308.77	4170.31	2792.20
Botswana	3349.07	3128.10	3055.62	4163.07	4896.58	5351.25	5374.55	5714.05	5623.38	5185.73	6346.16	7645.21	7029.23	7007.63	7493.76	6527.51	6954.17	7595.60	5691.15
DRC	405.47	153.70	175.14	173.92	194.17	218.52	255.59	286.51	327.77	298.81	334.23	387.32	424.86	458.13	487.20	497.63	444.41	457.85	332.29
Lesotho	474.82	437.82	407.81	603.64	781.51	862.95	915.78	918.54	935.39	924.11	1169.27	1350.68	1281.62	1193.00	1218.47	1152.32	1039.70	1181.81	936.07
Malawi	153.26	146.76	290.98	260.11	274.23	280.37	297.70	320.22	372.84	420.74	458.87	512.13	374.50	332.92	354.73	362.66	300.31	338.48	325.10
Mauritius	3861.03	3792.18	3957.51	4623.35	5229.88	5116.05	5695.97	6574.65	8030.06	7318.13	8000.38	9197.03	9291.23	9637.00	10153.94	9260.45	9681.62	10547.22	7220.43
Mozambique	277.65	256.44	262.88	283.89	336.33	369.15	385.76	422.15	503.13	463.85	419.23	526.53	566.05	605.99	623.29	528.31	382.07	415.72	423.80
Namibia	2058.00	1834.29	1713.05	2482.37	3288.26	3573.15	3881.21	4202.51	4029.07	4153.50	5191.58	5600.97	5749.40	5490.04	5392.71	4852.09	4560.70	5227.18	4071.12
Seychelles	7578.85	7663.14	8331.26	8524.96	10176.66	11092.51	12014.40	12154.83	11122.86	9706.96	10804.68	12189.10	11998.45	14764.94	14700.22	14725.10	15060.99	15504.46	11561.91
South Africa	2982.00	2621.55	2461.36	3678.10	4745.07	5277.93	5506.20	5994.20	5695.06	5831.12	7275.38	7976.47	7478.23	6822.52	6433.94	5746.68	5280.02	6160.73	5442.59
Eswatini	1637.45	1437.63	1325.00	2020.99	2529.63	2873.86	2937.36	3047.49	2842.44	3032.52	3690.24	3934.27	3864.76	3587.00	3379.90	3047.95	2770.20	3224.39	2843.50
Tanzania	306.72	304.34	308.06	323.07	345.19	442.25	471.53	528.06	651.26	658.76	701.60	733.41	820.16	901.73	950.37	872.30	877.51	936.33	618.48
Zambia	341.91	378.27	377.13	429.16	530.28	691.32	1030.15	1104.59	1369.07	1139.11	1463.21	1644.62	1734.93	1850.79	1738.09	1313.89	1262.99	1509.80	1106.07
Zimbabwe	547.36	548.06	507.35	453.35	454.36	444.76	414.80	397.00	325.68	624.27	719.98	840.95	968.16	1026.39	1031.10	1033.42	1029.08	1079.61	691.43
Madagascar	245.94	278.56	262.29	316.80	245.12	274.82	292.15	377.85	470.73	415.69	412.73	454.96	443.91	461.72	452.46	402.09	401.74	449.72	369.96

Source: “World Development Indicator” World Bank (2018)

Appendix Table 10. Average Bilateral Trade Statistics for the period 2000-2017 (US$ Millions)

Country Pair	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola-Botswana	0.50	0.63	0.62	0.63	0.61	0.70	2.25	0.58	1.22	0.48	0.24	0.66	0.27	0.64	0.66	0.87	0.78	0.42
Angola-DRC	0.59	0.56	0.66	0.93	1.10	1.79	2.81	3.91	1.42	0.67	1.25	1.23	1.10	2.88	7.58	3.50	2.37	2.70
Angola-Lesotho	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.31	0.01	0.00	0.00	0.00	0.00	0.00
Angola-Malawi	0.00	0.00	0.01	0.00	0.05	0.01	0.00	0.10	0.00	0.03	0.00	0.04	0.04	0.02	0.00	0.02	0.02	0.02
Angola-Mauritius	6.78	6.81	6.94	7.35	7.68	8.12	10.31	1.70	0.39	2.62	1.23	0.36	0.30	0.26	1.09	0.54	0.37	0.27
Angola-Mozambique	0.20	0.21	0.09	0.36	0.30	0.35	0.64	1.39	6.37	7.56	1.82	9.09	9.39	3.13	2.41	2.43	1.63	2.11
Angola-Namibia	26.81	23.56	51.53	87.30	68.32	58.95	65.05	88.63	224.93	374.73	164.22	172.55	212.81	174.53	169.35	81.46	43.46	37.56
Angola-Seychelles	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.05	0.02	0.05	0.06	0.21	0.10	0.33	0.14	0.09	0.10
Angola-South Africa	135.7	56.1	125.6	171.2	245.7	393.6	488.6	1343.9	2111.4	1262.3	1340.0	1321.2	2117.3	1515.2	1609.8	1093.7	976.1	1005.8
Angola-Eswatini	2.23	0.84	0.96	1.47	1.59	2.37	4.11	5.69	6.13	8.51	1.47	3.73	10.50	3.68	0.31	2.69	1.98	2.15
Angola-Tanzania	0.13	0.17	0.40	0.17	0.26	0.47	0.91	0.72	0.51	0.48	2.64	8.17	1.56	7.61	2.76	0.99	1.18	0.57

Angola-Zambia	0.16	0.07	0.15	0.38	0.26	0.20	0.14	0.25	0.42	0.62	1.05	1.21	9.15	2.63	3.50	1.55	1.02	0.99
Angola-Zimbabwe	1.13	0.26	0.92	0.71	0.97	0.27	0.11	0.48	0.71	0.94	1.21	2.55	0.68	0.29	0.15	0.51	0.34	0.27
Angola-Madagascar	0.00	0.01	0.00	0.00	0.02	0.01	0.04	0.02	0.05	0.06	0.03	0.07	2.24	0.72	0.23	0.08	0.03	0.04
Botswana-DRC	0.25	0.69	3.07	0.52	0.19	0.99	1.96	1.21	6.35	6.16	9.93	9.67	3.49	2.70	1.95	1.83	1.01	0.60
Botswana-Lesotho	0.64	0.62	0.26	0.16	0.11	0.13	0.16	0.07	0.30	0.12	1.00	3.26	4.07	3.04	1.77	0.81	1.04	0.94
Botswana-Malawi	2.20	1.22	1.65	1.31	1.68	1.21	1.31	1.48	2.63	3.15	3.36	13.21	4.04	5.77	4.19	3.26	4.08	4.78
Botswana-Mauritius	0.52	0.37	0.86	1.68	1.10	2.81	1.48	0.74	1.74	2.05	1.15	1.10	1.31	6.06	2.28	1.23	0.88	0.28
Botswana-Mozambique	0.24	0.09	0.29	1.29	1.06	0.68	2.84	1.28	2.83	3.20	3.05	11.35	7.81	2.74	5.34	12.66	36.23	20.76
Botswana-Namibia	5.68	3.91	5.97	5.99	9.28	11.33	13.53	16.09	31.73	29.71	35.87	40.86	260.77	438.46	674.94	770.52	655.5	402.39
Botswana-Seychelles	0.00	0.00	0.00	0.02	0.00	0.07	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.03	0.01	0.02	1.06
Botswana-South Africa	428	392	736	912	754	762	727	962	1234	1026	2303	2624	2824	2715	2788	2511	2273	2076
Botswana-Eswatini	0.15	0.65	1.00	1.20	0.34	2.07	4.50	4.00	3.81	4.33	5.47	5.29	5.55	5.15	4.48	5.72	6.46	7.02
Botswana-Tanzania	0.87	0.75	0.51	0.48	0.56	1.56	0.53	0.76	0.84	1.90	1.54	2.67	4.01	0.78	3.70	0.53	0.84	0.22

Botswana-Zambia	5.66	4.86	10.20	3.74	4.79	17.63	11.97	16.07	22.49	26.24	25.82	41.79	40.65	30.67	36.62	33.58	24.01	23.75
Botswana-Zimbabwe	78.24	42.34	57.43	49.50	77.98	90.78	133.75	179.72	132.30	82.84	88.32	94.57	80.71	81.59	68.68	58.09	52.82	50.33
Botswana-Madagascar	0.12	0.00	0.00	0.01	0.03	0.03	0.01	0.00	0.03	0.04	0.40	0.03	0.13	0.07	0.07	0.06	0.03	0.07
DRC-Lesotho	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DRC-Malawi	0.01	0.02	0.40	0.13	0.06	0.15	0.09	0.04	3.63	2.31	0.48	1.48	0.24	4.18	0.73	1.06	1.24	1.44
DRC-Mauritius	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.00
DRC-Mozambique	0.00	0.00	0.03	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.28	0.39	1.74	0.00	0.00	0.00	0.00
DRC-Namibia	0.08	2.14	0.03	1.62	5.28	6.09	23.56	22.21	32.38	35.78	36.09	48.30	52.12	86.47	160.28	135.83	52.68	60.81
DRC-Seychelles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DRC-South Africa	65.61	60.10	79.71	85.80	109.85	138.36	191.00	324.06	579.76	300.26	445.08	567.59	764.15	709.92	646.51	576.91	459.6	503.64
DRC-Eswatini	0.02	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
DRC-Tanzania	4.60	4.51	8.34	6.80	21.87	32.41	30.18	43.48	76.54	44.62	80.93	66.17	96.93	122.40	145.37	102.42	150.4	105.08
DRC-Zambia	0.00	16.93	16.18	24.78	61.35	63.85	81.00	188.64	406.21	393.89	786.90	858.39	988.37	1532.0	1124.7	733.56	701.0	1138.89
DRC-Zimbabwe	10.02	46.30	10.29	5.72	9.59	40.00	100.66	61.33	32.60	29.38	43.07	45.24	44.48	41.66	36.78	34.43	29.15	32.31

DRC-Madagascar	0.03	0.09	0.01	0.12	0.04	0.75	0.04	0.18	0.06	0.83	0.79	0.06	0.09	0.03	0.03	0.15	0.04	0.03
Lesotho-Malawi	0.00	0.00	0.00	0.11	1.10	0.12	0.23	0.37	0.46	0.00	0.14	0.49	0.04	0.08	0.19	0.08	0.08	0.28
Lesotho-Mauritius	0.25	0.00	0.01	0.13	0.42	0.57	0.98	0.79	0.40	0.29	1.51	1.85	0.96	0.78	0.54	0.42	0.52	0.68
Lesotho-Mozambique	0.00	0.00	0.00	0.01	0.03	0.41	0.31	0.32	0.05	0.50	0.55	1.79	0.62	0.14	0.09	0.01	1.32	2.43
Lesotho-Namibia	0.00	0.03	0.00	0.01	0.03	0.14	0.13	0.29	0.33	0.42	0.47	0.35	0.52	0.41	0.37	0.30	0.18	0.55
Lesotho-Seychelles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lesotho-South Africa	144.73	181.45	192.22	252.09	217.65	206.97	209.60	206.53	304.40	399.74	741.62	906.26	1010.3	911.33	872.89	794.12	776.8	808.60
Lesotho-Eswatini	0.02	0.22	0.17	2.18	0.19	2.40	7.38	1.96	1.98	1.55	5.93	6.73	7.60	7.66	7.99	7.30	6.99	7.13
Lesotho-Tanzania	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.07	0.25	0.22	0.11	0.13	0.13	0.11	0.09
Lesotho-Zambia	0.02	0.06	0.07	0.04	0.65	0.17	1.13	0.25	0.21	0.10	0.30	2.04	4.81	5.62	4.56	3.96	4.37	4.03
Lesotho-Zimbabwe	0.55	0.52	0.61	0.27	0.82	0.05	0.02	1.16	0.30	6.49	2.64	1.91	1.05	0.77	0.85	0.64	0.62	2.94
Lesotho-Madagascar	0.00	0.02	0.02	0.19	0.90	1.39	1.35	2.22	2.49	2.25	0.12	0.03	0.00	0.01	0.00	0.00	0.03	0.27
Malawi-Mauritius	0.80	0.38	0.81	0.91	0.69	0.22	0.15	0.65	1.87	1.80	1.83	3.04	4.35	2.65	5.86	6.80	14.12	14.50

Malawi-Mozambique	6.85	14.26	16.40	25.94	53.60	60.78	52.19	52.69	129.11	96.26	25.22	38.35	59.66	109.65	124.38	50.41	48.39	60.36
Malawi-Namibia	0.07	1.07	0.04	0.06	0.06	0.09	0.26	0.22	0.38	3.12	21.64	19.77	1.30	3.40	1.57	1.39	1.26	1.60
Malawi-Seychelles	0.01	0.00	0.02	0.01	0.28	0.74	0.69	0.44	0.38	172.91	0.15	0.06	0.10	0.12	0.51	0.27	0.25	0.30
Malawi-South Africa	132.85	131.06	153.27	165.91	168.75	200.61	227.55	230.31	313.94	155.69	305.67	298.46	292.67	322.40	280.13	231.24	229.8	260.98
Malawi-Eswatini	3.72	0.81	3.22	1.41	1.39	1.34	2.73	1.28	2.49	3.03	5.01	4.60	4.81	2.89	4.28	5.56	4.26	4.22
Malawi-Tanzania	6.77	4.85	6.42	5.62	13.12	13.02	17.90	29.74	52.76	32.17	25.82	46.76	43.68	31.99	35.89	32.53	30.61	41.85
Malawi-Zambia	19.42	7.06	7.80	15.05	24.63	38.53	31.95	23.60	40.33	45.24	68.07	71.73	89.75	102.41	81.11	65.70	70.48	55.71
Malawi-Zimbabwe	24.10	13.98	30.95	24.62	26.94	32.35	32.53	75.58	55.94	45.61	58.59	76.13	52.79	55.21	62.82	61.70	64.09	72.95
Malawi-Madagascar	0.00	0.00	0.29	1.77	1.22	0.65	0.74	1.84	0.09	0.01	0.25	0.10	0.07	1.36	0.84	1.34	1.18	1.56
Mauritius-Mozambique	0.87	0.68	2.35	2.02	7.17	5.77	2.40	2.40	3.93	10.06	5.58	12.53	10.95	17.12	18.31	14.48	12.72	14.02
Mauritius-Namibia	0.22	0.16	0.30	0.44	0.41	0.23	0.13	0.91	1.04	1.09	0.88	2.04	1.67	1.64	1.62	1.87	2.11	3.09
Mauritius-Seychelles	3.62	4.62	16.11	6.72	10.07	10.05	16.60	20.27	23.33	20.56	19.32	82.02	21.17	27.42	23.43	37.18	35.68	31.31
Mauritius-South Africa	154.93	147.47	138.55	150.89	155.98	166.51	160.51	170.97	226.93	190.55	229.97	251.10	276.62	260.76	264.97	248.71	255.4	323.41

Mauritius-Eswatini	4.68	2.26	2.50	5.21	4.26	2.12	2.47	2.48	2.59	2.36	2.11	2.30	2.32	2.20	2.22	2.58	2.57	4.18
Mauritius-Tanzania	1.77	2.57	1.54	1.38	3.92	2.60	1.64	1.65	2.08	1.87	3.98	3.92	9.31	8.80	6.89	12.48	10.27	3.63
Mauritius-Zambia	1.22	2.35	4.77	3.19	4.00	3.11	3.92	5.52	10.21	12.11	9.18	27.06	24.09	21.23	42.36	122.94	89.73	55.91
Mauritius-Zimbabwe	7.19	5.12	5.83	2.24	3.17	2.62	2.33	3.18	2.77	3.04	4.89	5.70	4.03	4.06	2.91	3.56	2.91	3.58
Mauritius-Madagascar	35.09	50.09	36.79	63.67	51.54	47.41	46.89	58.21	62.30	53.75	71.09	74.20	67.10	68.38	86.68	82.50	91.04	90.65
Mozambique-Namibia	1.09	0.41	0.32	1.99	6.53	10.30	9.67	8.26	9.57	7.51	8.18	16.76	23.76	33.99	27.65	50.07	22.47	20.69
Mozambique-Seychelles	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.04	0.13	0.04	0.12	0.01	0.65	0.22	0.50
Mozambique-South Africa	331.52	305.83	285.66	400.34	462.56	591.98	593.66	760.02	851.81	960.91	1034.7	1552.8	1578.0	2087.0	1985.8	1540.8	1328	1611.21
Mozambique-Eswatini	17.38	12.92	29.77	45.11	46.87	43.34	70.96	13.39	14.03	14.47	92.38	88.84	92.10	93.25	93.62	82.76	78.79	82.52
Mozambique-Tanzania	0.79	0.72	0.56	1.39	2.98	3.96	10.71	12.32	15.32	11.28	25.61	31.24	21.81	57.86	35.77	19.28	9.82	8.61
Mozambique-Zambia	2.58	1.26	0.79	2.72	1.38	3.89	5.33	15.90	18.32	12.97	6.26	16.94	22.33	16.77	31.62	33.62	64.35	52.86
Mozambique-Zimbabwe	41.35	34.10	63.48	29.24	27.55	27.90	31.65	130.10	29.95	46.40	43.84	72.10	96.43	126.17	179.52	147.81	82.81	101.29
Mozambique-Madagascar	0.02	0.06	0.05	0.24	0.19	0.07	0.49	0.92	0.88	0.52	1.86	1.38	0.86	1.68	1.30	2.10	2.51	3.24

Namibia-Seychelles	0.00	0.01	0.03	0.15	0.02	0.04	0.00	0.01	0.02	0.11	1.36	0.33	0.02	0.00	0.09	0.34	0.45	0.16
Namibia-South Africa	389.33	427.88	332.57	386.13	675.28	717.14	783.73	1078.8	1171.2	1580.5	2658.4	2919.4	2669.4	2832.6	2674.3	2625.8	2153	2326.48
Namibia-Eswatini	0.49	0.52	0.10	1.92	2.77	3.20	5.40	10.80	11.46	12.16	31.92	30.08	36.03	36.34	44.24	30.14	28.21	30.74
Namibia-Tanzania	0.18	0.13	0.28	0.37	0.25	0.40	0.56	0.61	0.83	1.61	0.97	0.83	58.48	31.26	10.78	2.67	2.37	1.80
Namibia-Zambia	1.45	1.00	1.05	1.32	5.14	8.52	8.73	17.31	16.30	29.66	35.13	58.27	91.70	120.19	74.96	122.39	175.0	161.47
Namibia-Zimbabwe	0.04	0.03	0.15	0.16	0.23	0.30	0.99	4.49	0.66	1.74	2.48	0.11	0.15	0.13	0.14	3.55	0.11	0.65
Namibia-Madagascar	0.00	0.01	0.00	0.04	0.02	0.01	0.02	0.00	0.03	0.15	0.02	0.02	0.00	0.08	0.01	0.00	0.01	0.07
Seychelles-South Africa	7.75	6.43	5.98	9.70	9.39	9.65	7.82	10.13	11.88	5.47	6.12	5.96	14.02	15.91	12.87	10.99	8.00	9.38
Seychelles-Eswatini	19.22	11.46	20.08	21.84	21.38	36.02	32.87	29.23	31.16	34.21	31.61	31.52	27.02	23.49	28.53	32.82	43.57	39.65
Seychelles-Tanzania	0.26	0.21	0.03	0.00	0.08	0.06	0.13	0.27	0.25	0.16	0.20	0.07	0.08	0.13	0.10	0.08	0.06	0.08
Seychelles-Zambia	0.00	0.00	0.02	0.01	0.00	0.02	0.04	0.20	1.80	0.19	0.25	0.00	0.01	0.10	0.32	0.35	0.24	0.06
Seychelles-Zimbabwe	0.17	0.05	0.08	0.02	1.89	0.72	0.41	0.50	0.67	0.62	0.86	1.00	0.96	0.95	0.92	0.90	0.78	0.86
Seychelles-Madagascar	0.73	1.88	3.02	0.63	0.70	0.70	2.35	2.29	6.46	3.23	7.35	8.01	4.57	3.89	6.50	3.68	6.42	6.59

South Africa-Eswatini	388.20	292.30	263.43	430.21	618.87	454.53	360.34	480.45	480.45	480.45	1843.6	1751.5	1822.8	1836.8	1821.8	1668.3	1606	1751.89
South Africa-Tanzania	97.92	96.73	101.53	145.25	207.42	288.97	323.06	309.33	417.97	338.11	457.6	625.9	645.4	528.9	460.0	440.3	393	362.19
South Africa-Zambia	371.66	343.63	344.45	391.26	567.45	620.85	818.85	1054.9	1236.7	887.1	1133.9	1551.0	1722.6	1816.7	1710.4	1420.7	1276	1368.04
South Africa-Zimbabwe	459.84	422.11	546.38	562.16	755.59	639.87	772.87	1141.2	1335.6	1178.5	1566.0	1933.6	1993.9	1957.9	1722.0	1585.9	1685	1315.21
South Africa-Madagascar	19.64	31.49	21.22	52.75	48.43	44.82	46.19	79.31	125.42	77.01	106.40	105.27	109.86	125.42	135.24	125.84	126	141.77
Eswatini-Tanzania	10.05	3.18	4.01	3.09	5.09	6.11	4.66	5.16	19.29	12.03	8.52	15.63	9.35	10.40	12.08	11.57	10.33	6.19
Eswatini-Zambia	3.35	2.52	3.67	2.43	1.48	5.34	1.89	4.16	4.54	3.52	7.17	5.51	8.81	7.84	13.65	9.72	6.76	14.76
Eswatini-Zimbabwe	11.66	3.92	10.28	30.17	2.17	4.49	96.40	4.38	3.99	6.00	26.09	24.76	20.03	19.88	19.89	17.60	16.23	17.57
Eswatini-Madagascar	0.66	1.87	0.33	1.55	35.67	3.31	4.20	5.71	4.42	2.14	0.58	1.31	1.86	1.35	2.01	2.65	2.70	3.42
Tanzania-Zambia	16.99	4.74	21.00	43.74	43.33	26.81	27.55	42.13	41.93	34.59	40.94	57.99	73.25	72.03	85.01	45.53	80.29	96.78
Tanzania-Zimbabwe	4.23	1.40	2.80	2.97	2.23	3.10	1.62	9.24	2.06	2.71	2.39	5.16	3.62	4.09	4.65	4.57	3.41	3.55
Tanzania-Madagascar	0.03	0.85	0.45	1.23	1.37	0.86	0.68	0.72	1.83	1.67	4.87	6.89	4.37	1.04	3.00	3.00	2.62	5.52
Zambia-Zimbabwe	47.22	34.57	60.15	70.95	88.36	269.78	265.00	304.72	327.16	300.81	323.77	366.89	413.09	404.60	356.27	387.65	357.8	309.11

Zambia-Madagascar	0.67	0.00	0.00	0.00	0.05	0.01	0.00	0.04	0.05	0.96	0.14	0.12	0.20	0.06	0.08	0.08	0.14	0.13
Zimbabwe-Madagascar	0.03	0.04	0.12	0.19	0.18	0.09	0.26	0.47	0.20	0.10	0.09	0.14	0.10	0.34	0.37	0.53	0.50	0.93

Source: “Direction of Trade Statistics” IMF (2018)

Appendix Table 11. Data Summary Statistics

Country Pair	Average Bilateral Trade US$ Millions (2000-2017)	Product of Country-Pair Land Mass Area (Km^2)	Distance Between Country-pair (Km)	Common Language	Landlocked	Common Currency Pairs	Common Land Border
Angola-Botswana	0.7092	725.2428	2224.045476	0	1	0	0
Angola-DRC	2.0581	2923.3345	549.6035669	1	0	0	1
Angola-Lesotho	0.0188	37.8436	2720.95923	0	1	0	0
Angola-Malawi	0.0203	147.7140	2304.882078	0	1	0	0
Angola-Mauritius	3.5069	2.5433	4910.441551	0	0	0	0
Angola-Mozambique	2.7505	996.5870	2793.702122	1	0	0	0
Angola-Namibia	118.0965	1027.6448	1584.372958	0	0	0	1
Angola-Seychelles	0.0697	0.5672	4679.278234	0	0	0	0
Angola-South Africa	961.8556	1519.8395	2456.274808	0	0	0	0
Angola-Eswatini	3.3553	21.6477	2706.585994	0	1	0	0
Angola-Tanzania	1.6507	1180.9989	2875.875118	0	0	0	0
Angola-Zambia	1.3192	938.2889	1791.712323	1	1	0	1
Angola-Zimbabwe	0.6941	487.1568	2213.101891	0	1	0	0
Angola-Madagascar	0.2030	658.6254	3771.6	0	0	0	0
Botswana-DRC	2.9210	1364.0742	2539.898564	0	1	0	0
Botswana-Lesotho	1.0282	17.6584	530.5906361	0	1	0	0
Botswana-Malawi	3.3630	68.9257	1449.140297	1	1	0	0
Botswana-Mauritius	1.5348	1.1867	3275.734194	1	1	0	0
Botswana-Mozambique	6.3190	465.0233	682.8486839	0	1	0	0
Botswana-Namibia	189.5869	479.5154	929.3654314	1	1	0	1
Botswana-Seychelles	0.0705	0.2647	3864.35638	1	1	0	0
Botswana-South Africa	1558.0790	709.1812	251.9522154	1	1	0	1
Botswana-Eswatini	3.7318	10.1012	547.4935141	1	1	1	0
Botswana-Tanzania	1.2812	551.0728	2449.497625	1	1	0	0
Botswana-Zambia	21.1415	437.8205	1066.036228	1	1	0	1
Botswana-Zimbabwe	83.3327	227.3151	961.3829253	1	1	1	1
Botswana-Madagascar	0.0626	307.3251	2316.9	0	0	0	0
DRC-Lesotho	0.0009	71.1782	3061.432758	0	1	0	0
DRC-Malawi	0.9828	277.8282	2288.825336	0	1	0	0
DRC-Mauritius	0.0084	4.7835	4889.825336	1	0	0	0
DRC-Mozambique	0.2311	1874.4326	3030.10326	0	0	0	0
DRC-Namibia	42.3187	1932.8477	2039.012696	0	0	0	0

DRC-Seychelles	0.0002	1.0669	4447.485183	1	0	0	0
DRC-South Africa	367.1052	2858.5929	2749.583946	0	0	0	0
DRC-Eswatini	0.0052	40.7161	2966.383176	0	1	0	0
DRC-Tanzania	63.5023	2221.2840	2666.642914	1	0	0	1
DRC-Zambia	506.4804	1764.7823	1881.260075	0	1	0	1
DRC-Zimbabwe	36.2776	916.2697	2316.379198	0	1	0	0
DRC-Madagascar	0.1867	1238.7768	4266.4	1	0	0	0
Lesotho-Malawi	0.2103	3.5966	1820.994144	1	1	0	0
Lesotho-Mauritius	0.6160	0.0619	3184.425281	1	1	0	0
Lesotho-Mozambique	0.4764	24.2652	624.8520236	0	1	0	0
Lesotho-Namibia	0.2520	25.0214	1279.211116	1	1	1	0
Lesotho-Seychelles	0.0003	0.0138	4020.613878	1	1	0	0
Lesotho-South Africa	507.6318	37.0055	402.0035129	1	1	1	1
Lesotho-Eswatini	4.1876	0.5271	488.5330085	1	1	1	0
Lesotho-Tanzania	0.0651	28.7553	2790.568945	1	1	0	0
Lesotho-Zambia	1.7991	22.8457	1546.737972	1	1	0	0
Lesotho-Zimbabwe	1.2340	11.8614	1339.664566	1	1	1	0
Lesotho-Madagascar	0.6268	16.0364	2333.7	0	1	0	0
Malawi-Mauritius	3.4140	0.2417	2613.319468	1	1	0	0
Malawi-Mozambique	56.9170	94.7137	1336.965643	1	1	0	1
Malawi-Namibia	3.1830	97.6654	2613.319468	1	1	0	0
Malawi-Seychelles	9.8465	0.0539	1336.965643	1	1	0	0
Malawi-South Africa	227.8473	144.4427	1995.035665	1	1	0	0
Malawi-Eswatini	3.1703	2.0574	1395.780755	1	1	0	0
Malawi-Tanzania	26.1951	112.2399	1002.280515	1	1	0	1
Malawi-Zambia	47.6985	89.1732	607.0164224	1	1	0	1
Malawi-Zimbabwe	48.1603	46.2985	489.8532261	1	1	0	0
Malawi-Madagascar	0.7399	62.5945	1563.2	0	1	0	0
Mauritius-Mozambique	7.9637	1.6307	2662.971171	0	0	0	0
Mauritius-Namibia	1.1030	1.6816	4176.760575	1	0	0	0
Mauritius-Seychelles	22.7484	0.0009	1740.243412	1	0	0	0
Mauritius-South Africa	209.6790	2.4869	3057.988552	1	0	0	0
Mauritius-Eswatini	2.8570	0.0354	2774.881728	1	1	0	0
Mauritius-Tanzania	4.4614	1.9325	2461.387694	1	0	0	0
Mauritius-Zambia	24.6063	1.5353	3131.717112	1	1	0	0
Mauritius-Zimbabwe	3.8400	0.7971	2741.218735	1	1	0	0
Mauritius-Madagascar	63.1867	1.0777	1056.5	1	0	0	0
Mozambique-Namibia	14.4022	658.9225	1612.199462	0	0	0	0
Mozambique-Seychelles	0.0997	0.3637	3396.344907	0	0	0	0

Mozambique-South Africa	1014.5769	974.5162	442.2752819	0	0	0	1
Mozambique-Eswatini	56.2507	13.8804	152.5420267	0	1	0	1
Mozambique-Tanzania	15.0016	757.2527	2245.033554	0	0	0	1
Mozambique-Zambia	17.2164	601.6278	1254.316586	0	1	0	1
Mozambique-Zimbabwe	72.8712	312.3633	910.6344994	1	1	0	1
Mozambique-Madagascar	1.0194	422.3085	1720.9	0	0	0	0
Namibia-Seychelles	0.1757	0.3751	4574.20691	1	0	0	0
Namibia-South Africa	1577.8944	1004.8861	1175.963976	1	0	1	1
Namibia-Eswatini	17.5846	14.3130	1474.890848	1	1	1	0
Namibia-Tanzania	6.3542	780.8518	2950.801676	1	0	0	0
Namibia-Zambia	51.6427	620.3770	1471.420635	1	1	0	1
Namibia-Zimbabwe	0.8956	322.0979	1590.139268	1	1	1	0
Namibia-Madagascar	0.0264	435.4693	3185.1	0	0	0	0
Seychelles-South Africa	9.3026	0.5547	3733.023771	1	0	0	0
Seychelles-Eswatini	28.6490	0.0079	3534.009465	1	1	0	0
Seychelles-Tanzania	0.1247	0.4310	1803.479147	1	0	0	0
Seychelles-Zambia	0.2003	0.3424	3199.804345	1	1	0	0
Seychelles-Zimbabwe	0.6865	0.1778	2987.913882	1	1	0	0
Seychelles-Madagascar	3.8321	0.2404	1808.3	1	0	0	0
South Africa-Eswatini	1019.5752	21.1683	299.201643	1	1	1	1
South Africa-Tanzania	346.6655	1154.8440	2143.223236	1	0	0	0
South Africa-Zambia	1035.3169	917.5091	1148.303885	1	1	0	0
South Africa-Zimbabwe	1198.5322	476.3680	944.3926431	1	1	1	1
South Africa-Madagascar	84.5346	644.0392	2121.6	0	0	0	0
Eswatini-Tanzania	8.7076	16.4489	2333.573925	1	1	0	0
Eswatini-Zambia	5.9506	13.0685	1244.070801	1	1	0	0
Eswatini-Zimbabwe	18.6386	6.7851	914.7148783	1	1	1	0
Eswatini-Madagascar	4.2072	9.1733	1869.9	0	1	0	0
Tanzania-Zambia	47.4789	712.9550	1533.684821	1	1	0	1
Tanzania-Zimbabwe	3.5444	370.1641	1488.13524	1	1	0	0
Tanzania-Madagascar	2.2776	500.4539	1615.1	0	0	0	0
Zambia-Zimbabwe	260.4412	294.0908	435.191425	1	1	0	1
Zambia-Madagascar	0.1517	397.6043	2078.9	0	1	0	0
Zimbabwe-Madagascar	0.2592	206.4350	1741.2	0	1	0	0

Note: Product of mass land area is divided by a factor of 1 000 000